BA400-Series Enclosures
Storage Devices Installation Procedures

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Contents

Chapter 2 TK-Series Tape Drive

Chapter 3 TLZ04 Tape Drive

Chapter 4 TF-Series Tape Drive

Figures

Tables

Preface

This manual describes add-on installation procedures for the various storage devices available for BA400-series system enclosures.

Structure of This Manual

Chapter 1 describes the installation of RF- and RZ-series integrated storage elements.

Chapter 2 describes the installation of TK-series tape drive subsystems.

Chapter 3 describes the installation of the TLZ04 tape drive.

Chapter 4 describes the installation of the TF-series tape drive.

Intended Audience

This document is intended for Digital Services personnel and self-maintenance customers.

Chapter 1

RF- and RZ-Series Integrated Storage Elements

1.1 General

Figure 1–1 shows the RF- and RZ-series integrated storage elements (ISE) in the 5.25-inch configuration. Figure 1–2 shows the RF-series integrated storage elements (ISE) in the 3.5-inch configuration. The two configurations vary as follows:

- 5.25-inch ISEs contain only one storage device.
- 3.5-inch ISEs can contain two storage devices.

BA400-series ISEs contain hardware and a circuit module to allow the ISE to be plugged into the enclosure backplane.

Figure 1–1: RF- and RZ-Series 5.25-inch ISE (Front and Rear View)

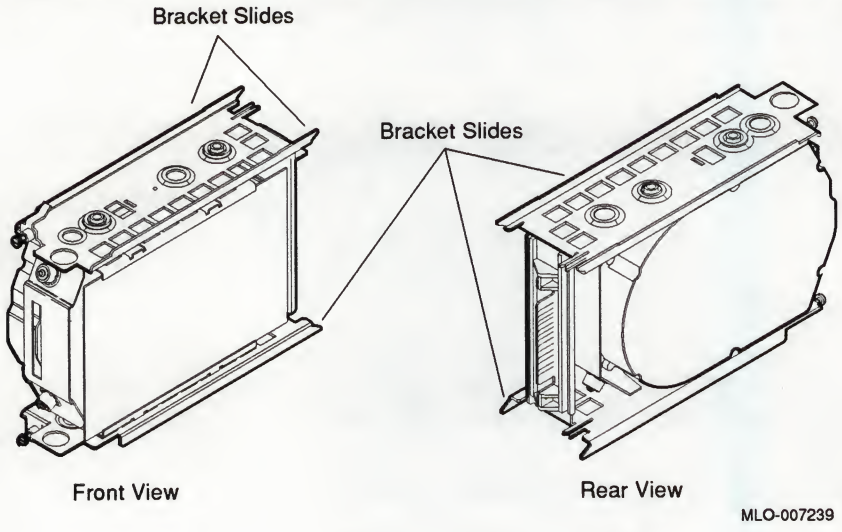


Figure 1–2: RF-Series 3.5-inch ISE (Front and Rear View)

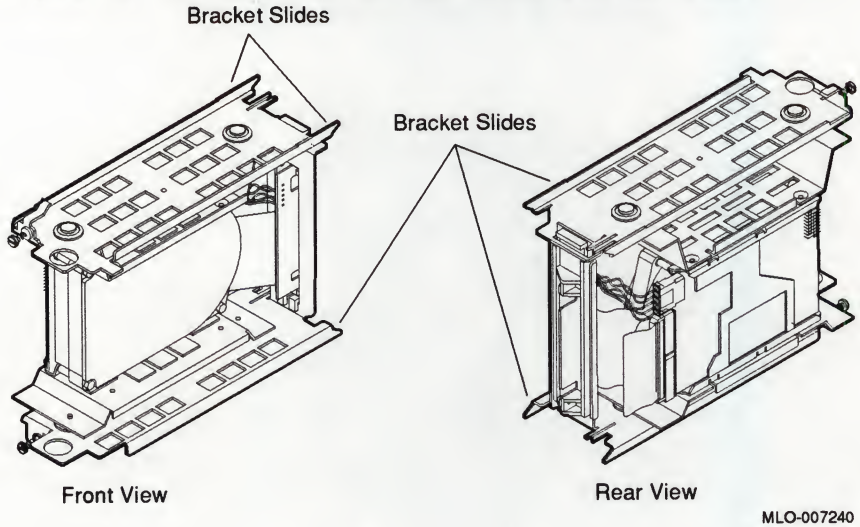
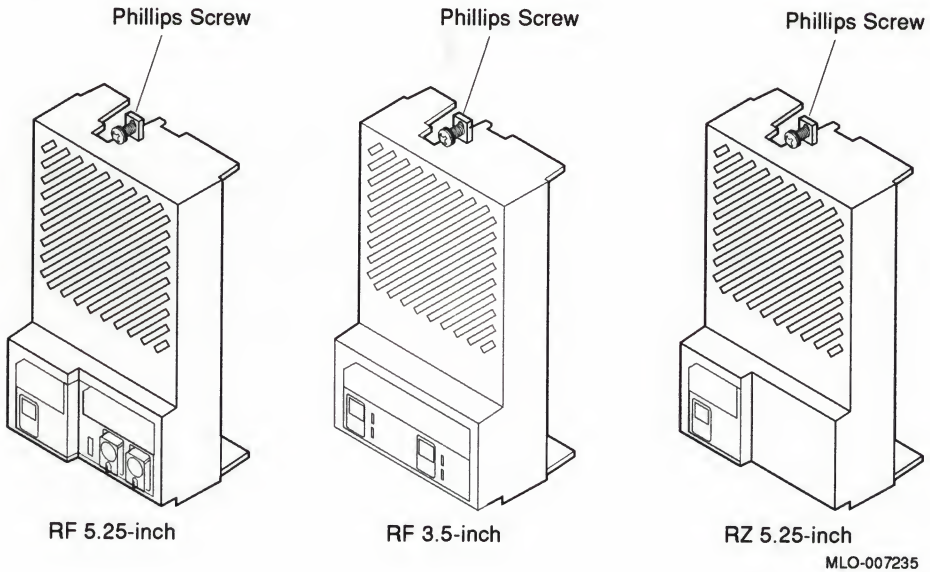


Figure 1–3 shows the front panel assemblies that come with the ISEs.

Figure 1–3: Front Panel Assemblies



NOTE: *The ISE front panel for RZ-series ISEs, unlike the front panel for RF-series ISEs, has no buttons or indicators, only a plug for the bus node ID.*

The term "integrated storage element" is used for any Digital Storage Systems Interconnect (DSSI) or Small Computer System Interface (SCSI) storage device. An ISE contains an on-board intelligent controller in addition to the drive and the control electronics.

RF-series ISE storage devices are based on the Digital Storage Architecture (DSA). The RF-series ISEs utilize the DSSI bus and interface. The DSSI interface supports up to seven ISEs. DSSI interfaces can be embedded within a CPU module such as the KA670 module. They can also be separate modules, such as the KFQSA, which is interfaced by a single cable to a DSSI connector in the host enclosure.

NOTE: *Within a system enclosure it is possible to have up to seven disk storage devices, provided there is no tape drive in the enclosure. There can*

be three 3.5-inch dual storage devices and one 5.25-inch or 3.5-inch single storage device.

RZ-series ISEs utilize the SCSI bus and interface. SCSI interfaces can be embedded within a CPU module such as the KN220 module. They can also be separate modules, such as the KZQSA which is connected by a single cable to a SCSI connector in the host enclosure.

NOTE: *VAX 4000 systems do not support RZ-series ISEs.*

For more detailed information about configuring RF- and RZ-series ISEs in a BA400-series enclosure, refer to the appropriate enclosure maintenance manual listed in Appendix A.

1.2 Installation Procedure

To install an RF- or RZ-series ISE in a BA400-series enclosure, perform the following procedures.

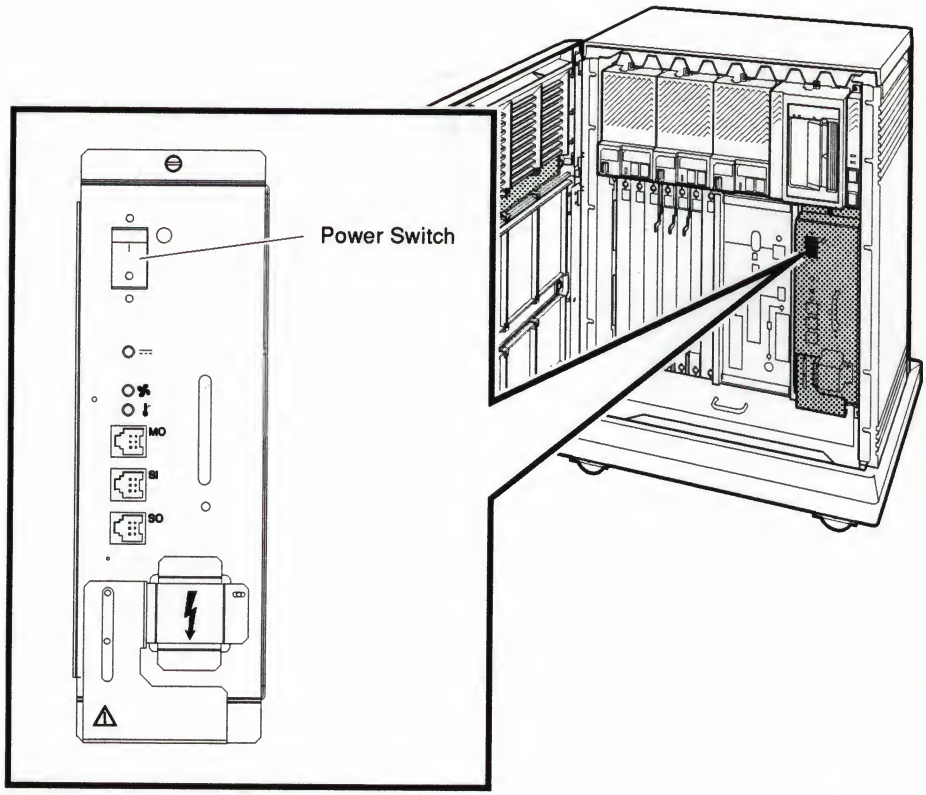
1.2.1 ISE Installation in an Empty Slot

CAUTION: *Static electricity can damage integrated circuits. Use the antistatic wrist strap and antistatic pad found in the static-protective field service kit (29-26246-00) when you work with the internal parts of a computer system.*

Handle the ISE with care. Dropping or bumping the ISE can damage the disk surface. Carry or hold the ISE by the underside of the lower bracket to avoid damaging the drive module.

1. After the system manager shuts down the operating system, open the enclosure door, as described in the appropriate enclosure installation manual listed in Appendix A, and set the Power switch to off (0) Figure 1–4.

Figure 1–4: Power Switch Location



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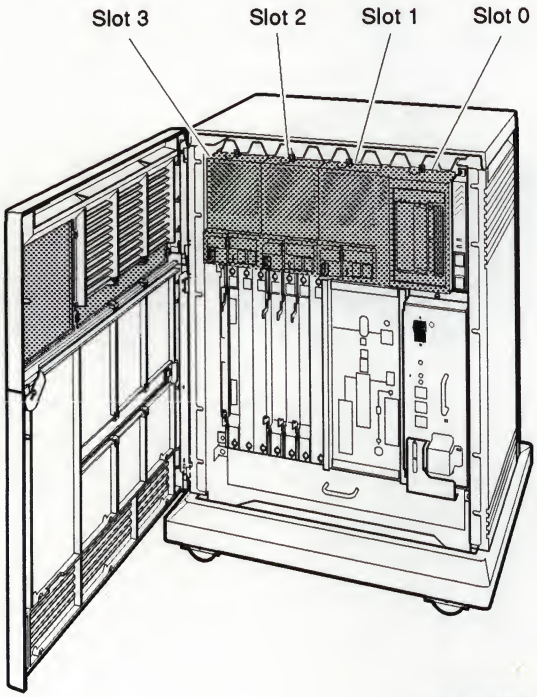
2. Always install ISEs working from right to left (Figure 1–5).

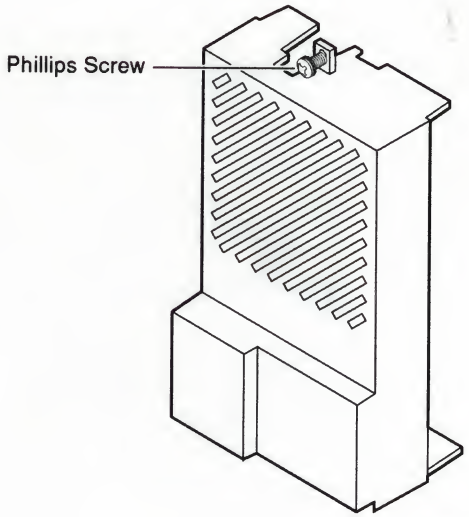
Figure 1–5: BA440 Enclosure



NOTE: *The first or right-most mass storage cavity in the mass storage area is wider than the rest to accommodate a larger device such as a tape drive. A small filler panel (70-27414-01) is used to fill the gap when an RF- or RZ-series ISE is installed in this first cavity.*

3. Loosen the captive Phillips screw at the top of the blank ISE front panel assembly Figure 1–6, and remove the panel.

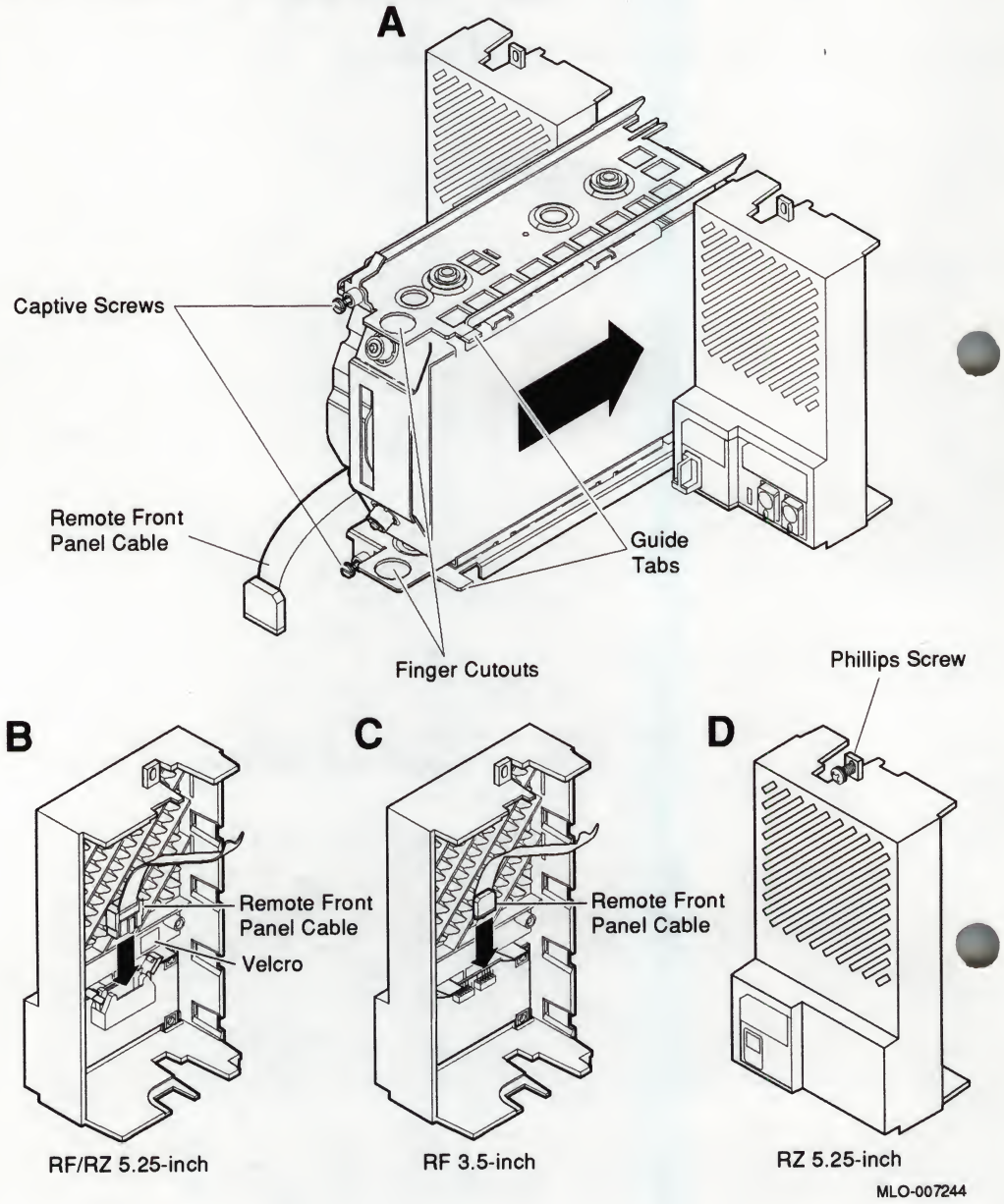
Figure 1–6: Blank Front Panel Assembly



4. For the 5.25-inch ISEs, with the ISE controller module facing to the right, slide the ISE along the guide rails into the mass storage cavity (Figure 1–7A).

   For 3.5-inch ISEs, with the controller module facing to the left, slide the ISE along the guide rails into the mass storage cavity (Figure 1–7A).

Figure 1–7: Install the ISE in the Storage Cavity



5. Using the upper and lower finger cutouts on the ISE brackets, firmly push the ISE brackets until the interface card at the rear of the ISE plugs into its backplane connector. The guide tabs on the upper and lower bracket should line up with the cutouts in the chassis. Tighten the two captive screws (Figure 1–7A).

   CAUTION: *It is normal for there to be a small gap between the ISE mounting bracket tabs and the enclosure frame. Tighten the captive screws only until they are securely fastened (9 inch-pounds). Do not try to force the tabs to fit flush against the frame.*

6. Plug the remote front panel cable(s) into the connector(s) inside the ISE front panel.

   For 5.25-inch ISEs (Figure 1–7B)
   For 3.5-inch ISEs (Figure 1–7C)

   For the 5.25-inch ISEs only, use Velcro on the cable and on the inside of the ISE front panel to secure the remote front panel cable. The 3.5-inch ISEs have a different connector scheme that does not require Velcro.

   NOTE: *The front panel for the 3.5-inch ISE has two remote front panel cables when there are two storage devices in the ISE. If the ISE contains only one storage device there is only one remote front panel cable.*

7. Attach the ISE front panel to the enclosure by first fitting the panel's lower tabs into position. Fit the panel into position and secure the panel with its single captive Phillips screw (Figure 1–7D).

1.3 Upgrading the ISE Storage Devices

The system's storage capacity can be increased by:

- Replacing an ISE with one that has a larger storage capacity
- Installing a second storage device on a 3.5-inch ISE.

The following sections describe how to upgrade the ISE storage devices.

1.3.1 Removing ISEs

To upgrade a system, it is necessary to remove an ISE. To remove an ISE follow these instructions:

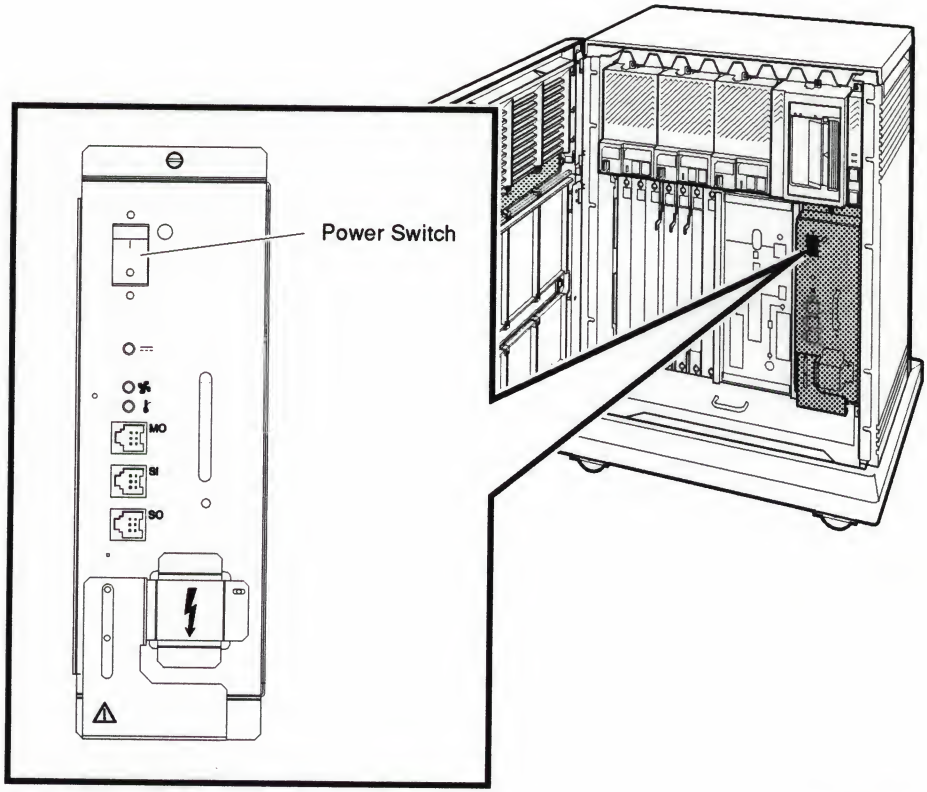
CAUTION: *Static electricity can damage integrated circuits. Always use the antistatic wrist strap and antistatic pad found in the static-protective field*

service kit (29-26246-00) when working with the internal parts of a computer system.

Handle ISEs with care. Dropping or bumping the ISE can damage the disk surface. Carry or hold the ISE by the underside of the lower metal bracket to avoid damage to the drive module.

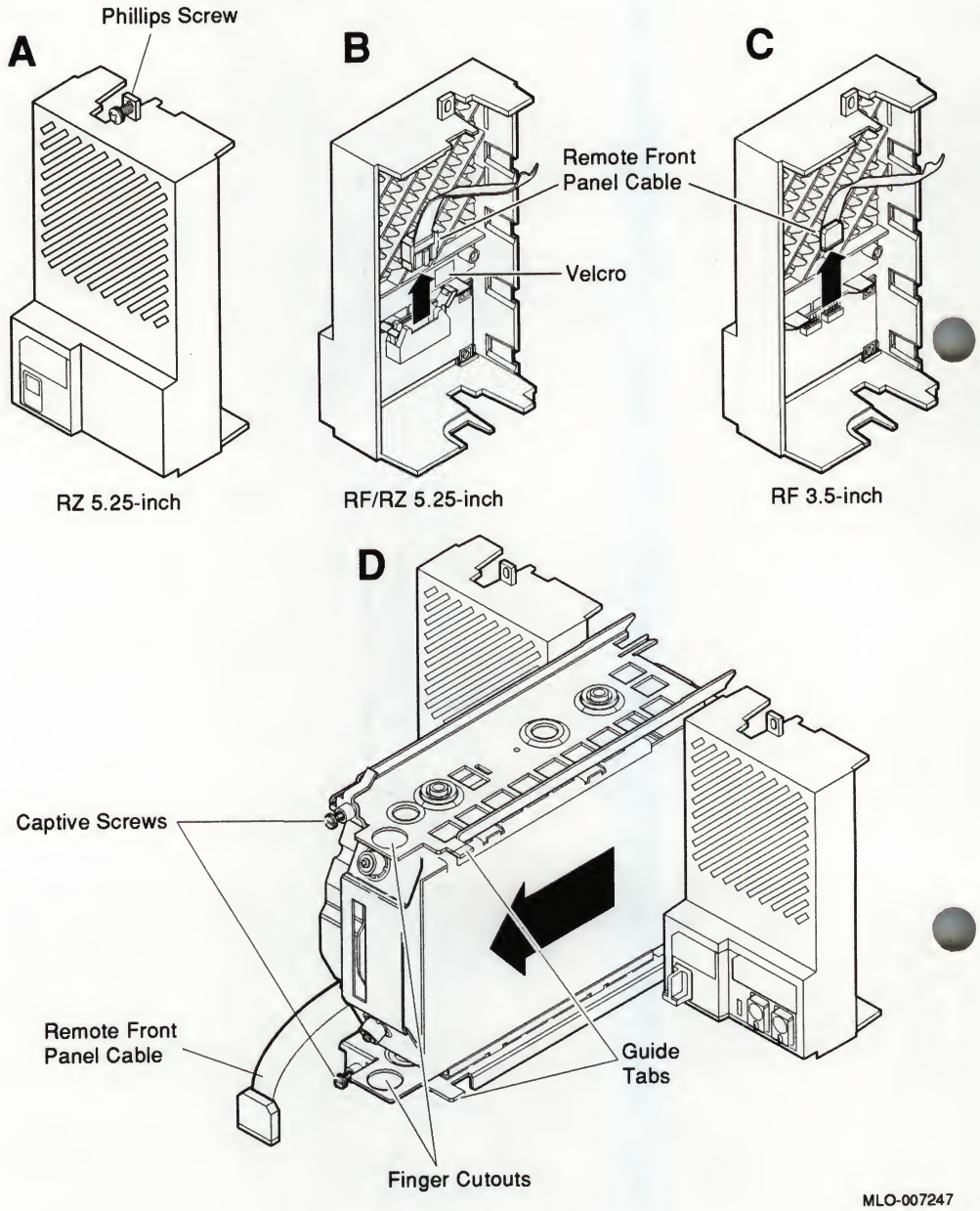
1. After the system manager shuts down the operating system, open the enclosure door, as described in the appropriate enclosure installation manual listed in Appendix A, and set the Power switch to off (0) (Figure 1–8).

Figure 1–8: Power Switch Location



2. Loosen the single captive Phillips screw (at the top) that secures an ISE front panel (Figure 1–9A).

Figure 1–9: Remove the ISE to be Upgraded or Replaced



3. Separate the ISE front panel from the enclosure, taking care not to strain the remote front panel cable(s) which is (are) connected to the ISE front panel.

4. Unplug the remote front panel cable(s) from the connector(s) inside the ISE front panel.

   For 5.25-inch ISEs (Figure 1–9B)
   For 3.5-inch ISEs (Figure 1–9C)

   NOTE: *If the ISE is a 3.5-inch device, there can be two cables.*

5. Loosen the upper and lower captive screws that hold the ISE in place (Figure 1–9D).

6. Using the upper and lower finger cutouts on the ISE brackets, carefully pull the ISE out of its backplane connector and slide the drive out of the enclosure. Support the weight of the ISE at the underside of the lower bracket as the ISE clears the enclosure (Figure 1–9D).

CAUTION: *Do not touch the drive module. The drive module contains sensitive electronic circuitry.*

If you are not upgrading a 3.5-inch ISE with a second storage device, go to Section 1.3.3.

1.3.2 Installing a Second Storage Device in a 3.5-inch ISE

The upgrade kit for the 3.5-inch ISE contains the following:

- Storage device
- Mounting hardware - four screws with washers
- Remote front panel cable
- *BA400-Series Enclosures Storage Devices Installation Procedures*

The following sections describe how to install a second storage device in a 3.5-inch ISE.

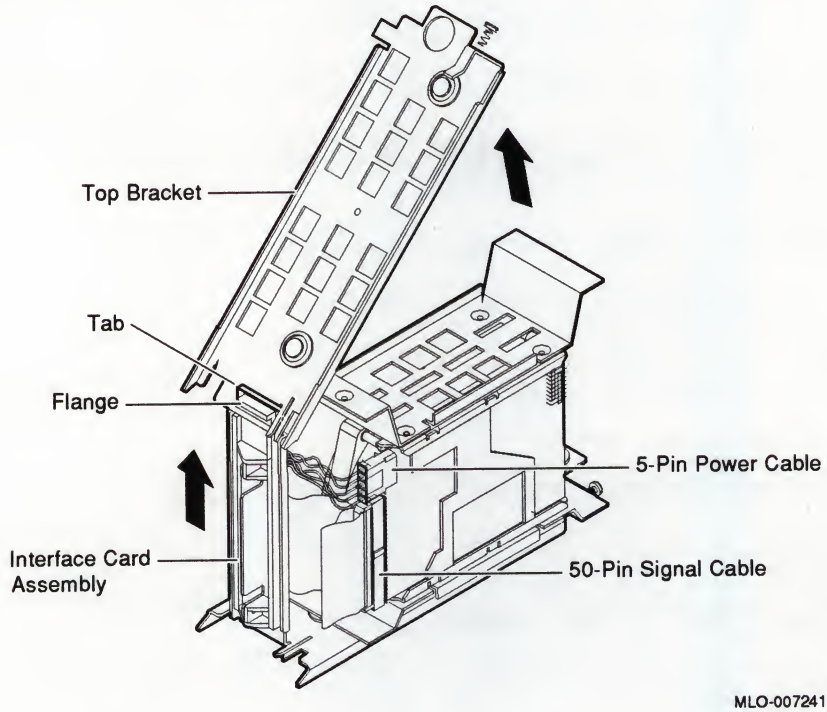
1.3.2.1 Remove the Top Outside Bracket

NOTE: *To ensure that each bus node ID plug remains with the original storage device, upgrade one 3.5-inch ISE at a time.*

Complete the following steps to remove the top outside bracket from the ISE:

1. Unplug the remote front panel cable from the storage device. Set it aside; it will be reinstalled later in the procedure.
2. Remove the two mounting screws on the top outside bracket and put them aside.
3. Push up the plastic flange of the interface card assembly, and lift the top outside bracket's rear slot over the plastic flange
4. Unplug the 5-pin power cable and the 50-pin signal cable from their connectors on the ISE controller module (Figure 1–10).

Figure 1–10: Remove the Top Outside Bracket From the ISE



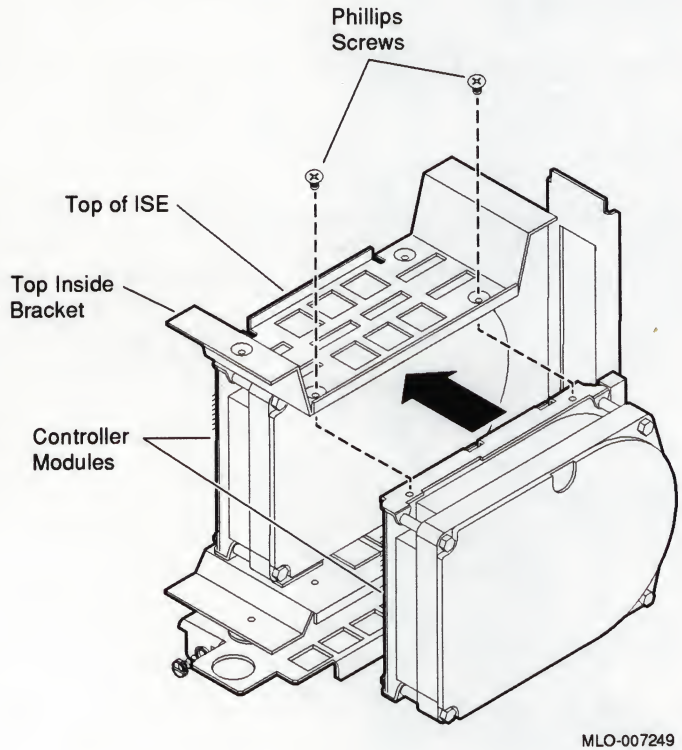
1.3.2.2 Secure the Second Storage Device To the Top and Bottom Inside Brackets

Complete the following steps to secure the second storage device to the top and bottom inside brackets of the ISE:

CAUTION: *Static electricity can damage integrated circuits. Use the antistatic wrist strap and antistatic pad found in the static-protective field service kit (29-26246-00) when you work with the internal parts of a computer system.*

1. With the new storage device aligned in the same orientation as the original storage device, the controller module to the left, line up the holes on the top inside bracket with the holes on the top of the storage device (Figure 1–11).
2. Use two Phillips screws and washers from the Upgrade Kit to connect the bracket to the top of the storage device, starting at the rear of the ISE.

Figure 1–11: Positioning the Second Storage Device Under the Top Inside Bracket

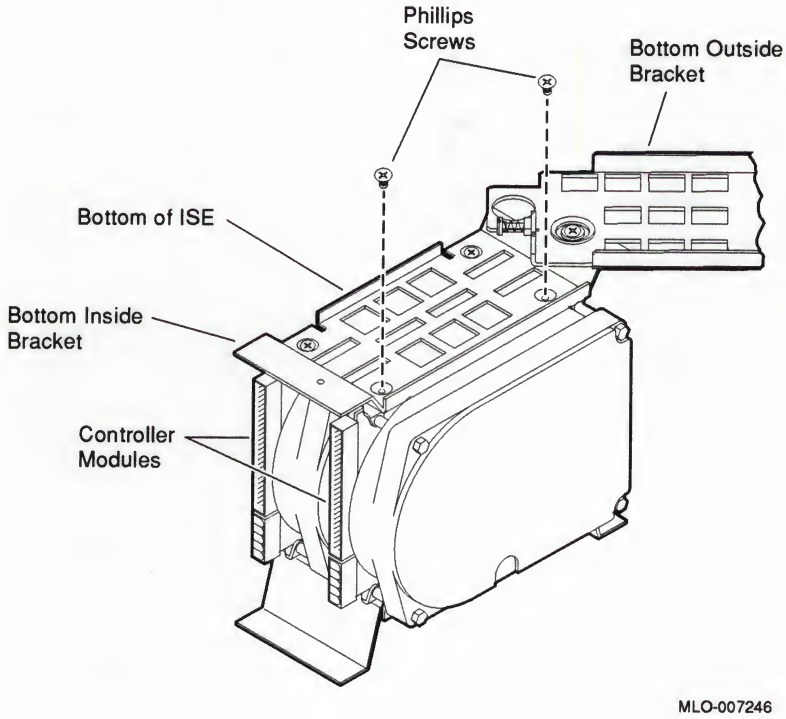


3. Gently turn the ISE upside down and place it on the top inside bracket. Remove the rear mounting screw on the bottom outside bracket and set it aside. Loosen the front mounting screw with one turn of the screwdriver.

   NOTE: *Do not disassemble the ISE any further.*

4. Move the bottom outside bracket to the right or left, until the two holes on the bottom inside bracket are accessible (Figure 1–12).

Figure 1–12: Securing the Second Storage Device to the Bottom Inside Bracket



5. Connect the storage device to the bottom inside bracket with the two remaining Phillips screws and washers from the Upgrade Kit.

1.3.2.3 Reinstall the Top Outside Bracket

The following steps describe how to complete the reinstallation of the top outside bracket:

1. Swivel the bottom outside bracket back to its original position.
2. Use the rear mounting screw, that you set aside, to secure the bottom outside bracket to the bottom inside bracket. Tighten the front mounting screw.
3. Gently turn the ISE upside down so that it is now resting on the bottom outside bracket.

4. Connect the 50-pin signal cables to the data connectors on the controller modules of the storage devices.
5. Connect the 5-pin power cables to the power connectors on the controller modules of the storage devices.
6. Push the plastic interface card assembly up.

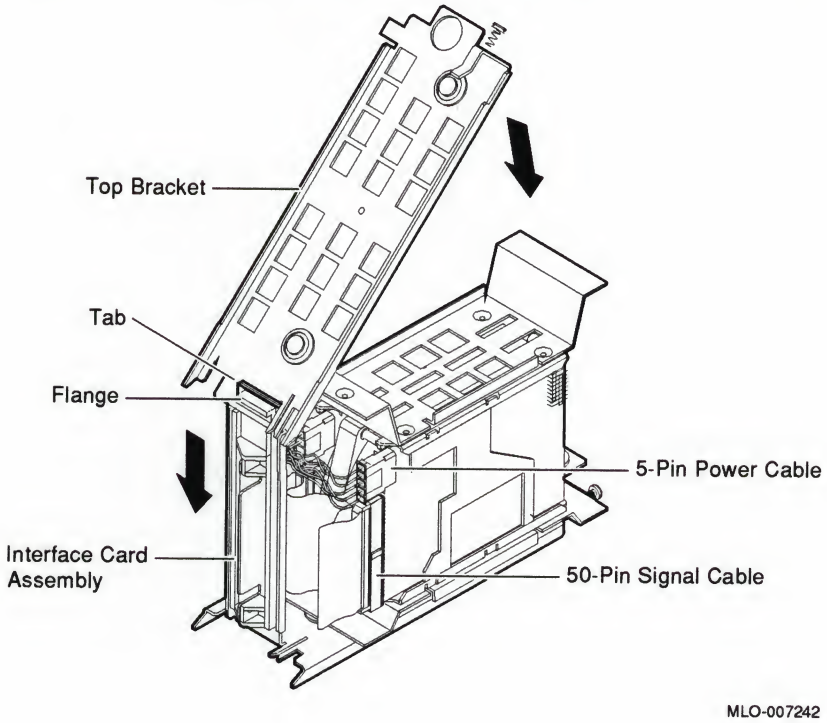
   NOTE: *Make sure that the flange, near the captive screw at the front of the top outside bracket, is pointing up.*

7. Lift the top outside bracket's rear slot over the flange of the plastic interface card assembly, and then over the tab at the back of the bottom outside bracket.

   NOTE: *Both the tab and the flange must be inside the slot.*

8. Push the top outside bracket onto the top inside bracket (Figure 1–13).

Figure 1–13: Replace the Top Outside Bracket



9. Use the two mounting screws, that you saved, to secure the top outside bracket to the top inside bracket.

10. Plug a remote front panel cable into each of the storage devices. One of the cables was removed from the original storage device and the other is provided with the Upgrade Kit.

1.3.3 Installing an Upgraded ISE in the Mass Storage Cavity

To install an upgraded 5.25-inch ISE or an upgraded 3.5-inch ISE, complete the following procedure.

1. For the 5.25-inch ISE, with the ISE controller module facing to the right, slide the ISE along the guide rails into the mass storage cavity (Figure 1–14A).

For the 3.5-inch ISE, with the controller module facing to the left, slide the ISE along the guide rails into the mass storage cavity (Figure 1–14A).

2. Using the upper and lower finger cutouts on the ISE brackets, firmly push the ISE brackets until the interface card at the rear of the storage device plugs into its backplane connector. The guide tabs on the upper and lower bracket should line up with the cutouts in the chassis. Tighten the two captive screws (Figure 1–14A).

   CAUTION: *It is normal for there to be a small gap between the ISE mounting bracket tabs and the enclosure frame. Tighten the captive screws only until they are securely fastened (9 inch pounds). Do not try to force the tabs to fit flush against the frame.*

3. Plug the remote front panel cable(s) into the connector(s) inside the ISE front panel.

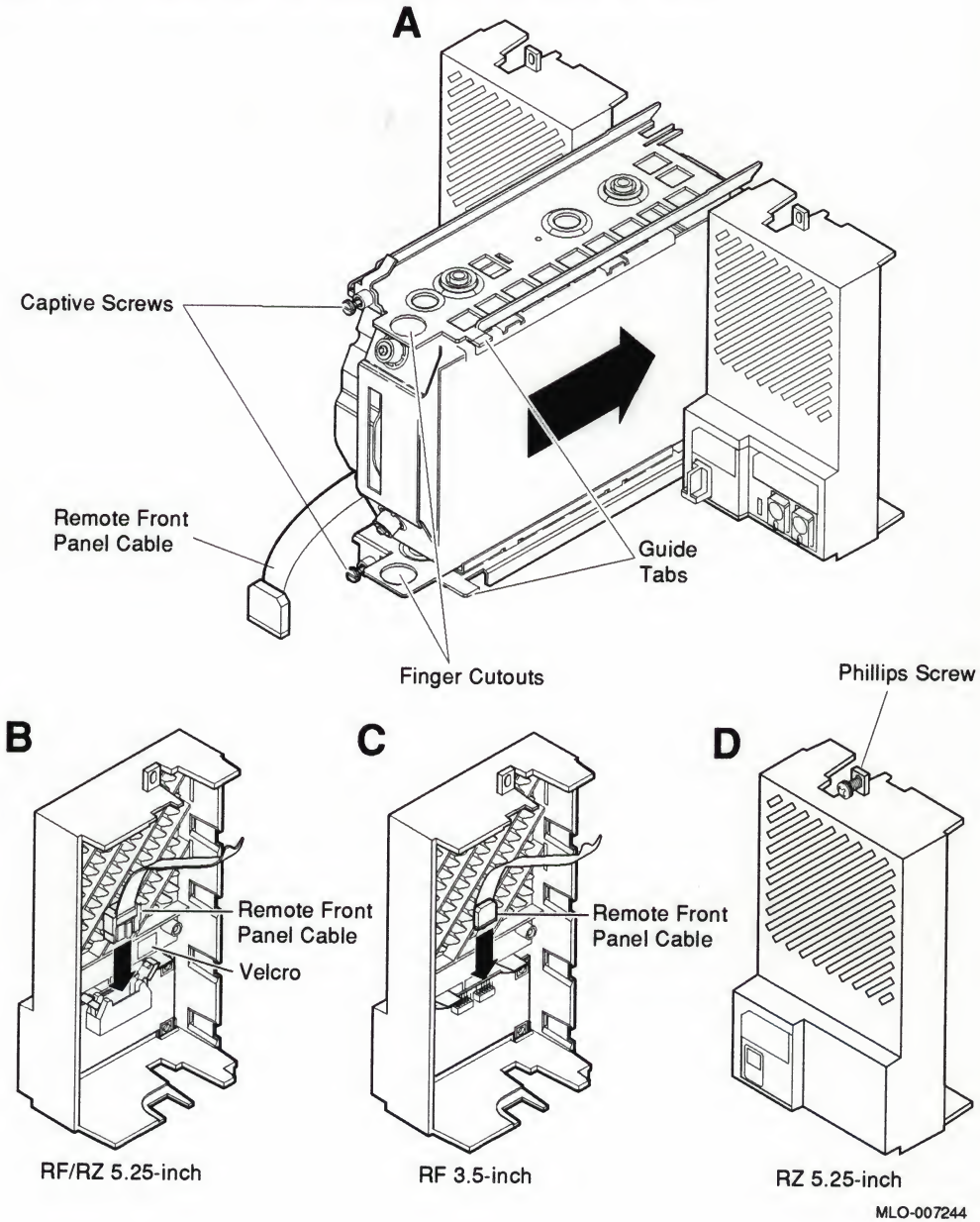
   For 5.25-inch ISEs (Figure 1–14B)
   For 3.5-inch ISEs (Figure 1–14C)

   For the 5.25-inch ISEs only, use Velcro on the cable and on the inside of the ISE front panel to secure the remote front panel cable. The 3.5-inch ISEs have a different connector scheme that does not require Velcro.

   NOTE: *The front panel for the 3.5-inch ISE has two remote front panel cables when there are two storage devices in the ISE. If the ISE contains only one storage device there is only one remote front panel cable.*

4. Attach the ISE front panel to the enclosure by first fitting the panel's lower tabs into position. Fit the panel into position and secure the panel with its single captive Phillips screw (Figure 1–14D).

Figure 1–14: Install the Upgraded ISE in the Storage Cavity



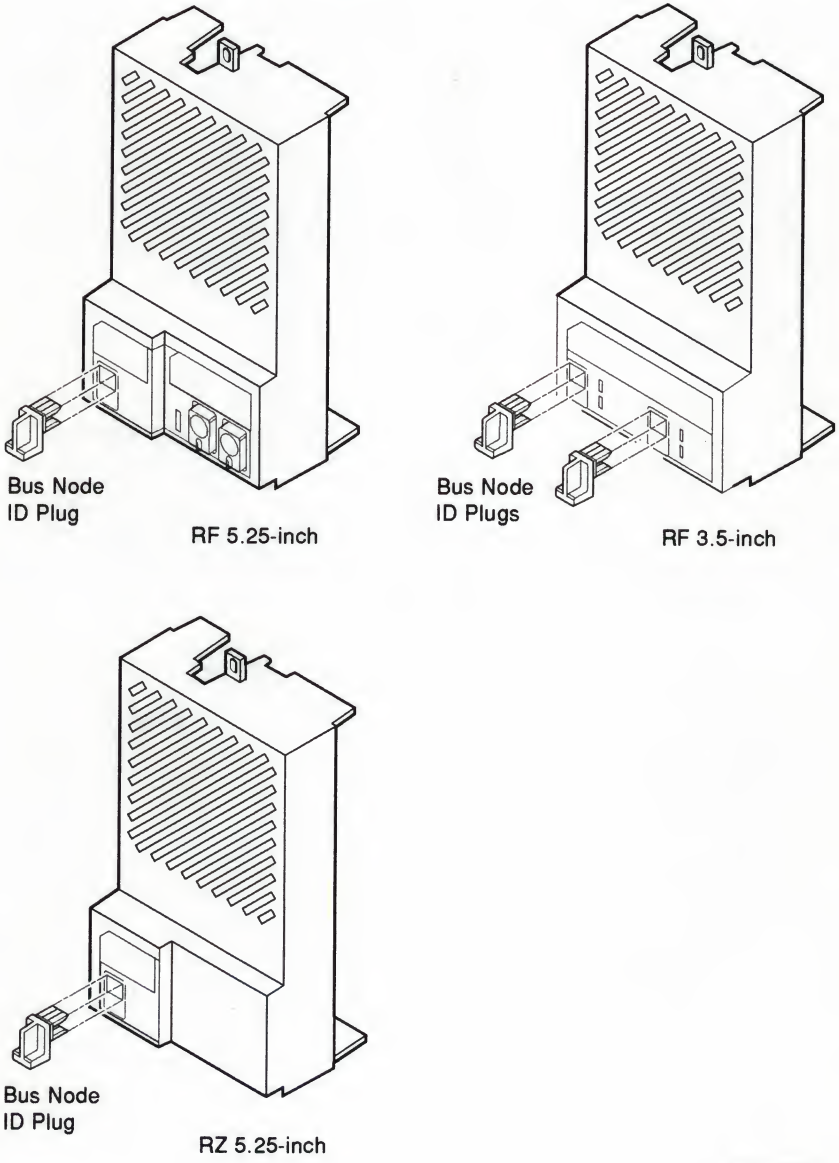
1.3.4 Bus Node ID Plug Installation

Bus node ID plugs have prongs at the rear that identify the bus node number (and by default, the unit number) of the ISEs to the system. Bus node ID plugs are shipped with the system.

The 3.5-inch configuration has two node ID plugs for two storage devices. When a 3.5-inch configuration contains only one storage device, the node ID plug for the empty cavity is unnumbered.

To insert a bus node ID plug (RF: 12-28766-19 and RZ: 12-28766-28), align the two center prongs with the two center slots of the receptacle on the ISE front panel (Figure 1–15). Push the plug firmly into the receptacle. To remove a bus node ID plug, grasp it firmly and pull it straight out.

Figure 1–15: Inserting DSSI Bus Node ID Plug



Use the following rules for numbering IDs for RF- and RZ-series ISEs:

- For each DSSI bus or SCSI controller, do not duplicate bus node numbers for storage elements. You can have only one storage element on bus 0 identified as node 0, one storage element as node 1, and so on.
- By convention, the ISEs are numbered in increasing order from right to left, starting with 0.

NOTE: *The DSSI node ID address assigned by the plug is read only during the power-up sequence. If you change the bus node ID plug while the system is operating, you must turn off the system and then turn it back on for the new ID addresses to take effect.*

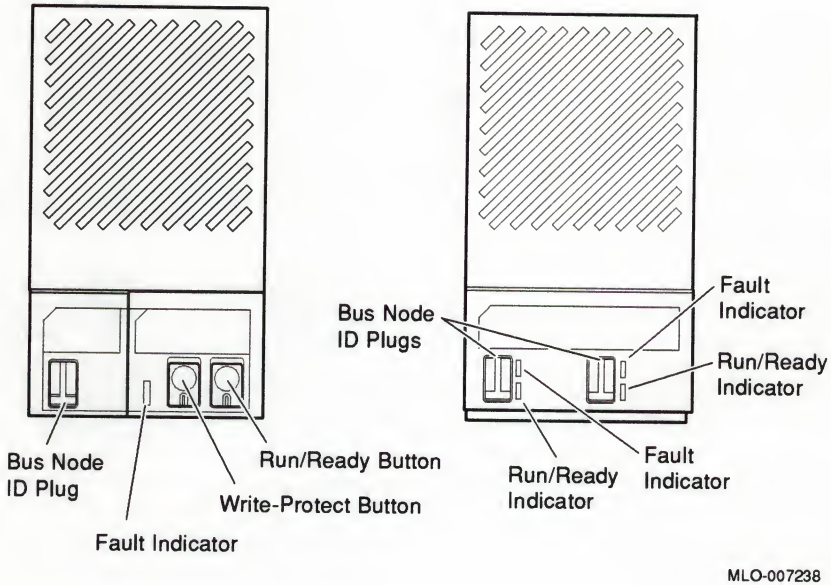
1.4 Power-On Self-Test (POST)

Once the system is turned on, the RF-series and RZ-series ISEs go through a power-on self-test (POST).

1.4.1 RF-Series POST

POST is executed whenever power is applied. For RF-series ISEs when POST is executed successfully, the green Ready and red Fault LEDs (Figure 1–16) go through the following sequence.

Figure 1–16: RF-Series ISE Front Panels



1. Both LEDs are lit.
2. Both LEDs turn off.
3. The green Ready LED flashes.
4. The green Ready LED remains lit steadily, the red Fault LED remains off.

Once this sequence occurs, the ISE is ready to be used. If POST fails, the red Fault LED remains lit.

When POST begins, the first action it takes is to start the spindle spin-up sequence. Other tests are performed while the spindle is spinning up. When there is more than one ISE on the system, spindle spin-up is staggered to limit the starting current drawn from the power supply for this function.

POST detects the following types of error conditions:

1. *Controller errors*—Caused by the hardware associated with the controller function of the drive module. These errors are fatal to the operation of the ISE since the controller cannot establish a logical

connection to the host. Controller errors cause the red Fault LED to light.

2. *Device errors*—Caused by the hardware associated with the device control function of the drive module. These errors are not fatal since the ISE can establish a logical connection and report the error to the host. Device errors cause both LEDs to turn off for about 1 second, then the red Fault LED lights.

If the ISE passes POST, continue to Section 1.5.

1.4.2 RZ-Series POST

POST for an RZ-series ISE is executed during power-up or from a host-initiated command. The execution time for the test should be less than two seconds. If the unit passes POST, it waits for a software command such as SHOW DEVICES. If POST fails, the device will not come on line and will not be listed in the device listing when the SHOW DEVICES command is issued.

1.5 Setting the DSSI ISE Parameters

Once installed and powered up, the DSSI ISE parameters must be set. This is done through the use of the local program PARAMS. The following procedures should be used when performing an ISE installation. If further information on the use of PARAMS is desired, refer to the appropriate integrated storage element user's guide (Appendix A) for a complete description of the PARAMS utility.

1.5.1 Accessing PARAMS

PARAMS can be accessed in one of three ways, depending on the system you're using:

1. Through VMS, using the SET HOST command
2. From the console, using the SET HOST command
3. Through MDM, using the Device Resident Programs menu

1.5.1.1 Using VMS

To access PARAMS on a system running VMS Version 5.3 or higher, the command is:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS nodename
```

where "nodename" is the node name of the ISE.

NOTE: *To find the node name, enter SHOW DEVICES or SHOW CLUSTER at the $ prompt.*

To produce a file in your directory of what appears on the screen, append the qualifier/log=filename.ext (where filename.ext is what you want to name the file) to the above command.

Once you are in PARAMS, control is turned over to the utility. All interaction is through the use of commands and responses.

To exit PARAMS, enter EXIT at the PARAMS> prompt, or press one of the following key combinations: CTRL/C, CTRL/Y, or CTRL/Z.

1.5.1.2 Using Console Commands

From console mode you can access the Diagnostic and Utility Program (DUP) to examine and set parameters. The command syntax depends upon whether your system uses an embedded adapter such as the KA670 module, or a Q–bus adapter (the KFQSA module).

Embedded Adapters

To access PARAMS from a system with an embedded adapter, enter:

```
>>> SET HOST/DUP/DSSI/BUS:<BUS_NUMBER>
<NODE_NUMBER> PARAMS
```

where

<BUS_NUMBER> is the DSSI bus number (0 or 1) and <NODE_NUMBER> is the bus node ID (0–7) for the device on the bus.

NOTE: *To find the DSSI bus number and node number, enter SHOW DSSI at the console (>>>) prompt.*

KFQSA Storage Adapter

To access PARAMS from a system with a Q–bus adapter, enter:

```
>>> SET HOST/DUP/UQSSP/DISK <controller_number> PARAMS
```

where

<controller_number> is the controller number (provided by the SHOW UQSSP display) for the device on the bus.

After you have completed setting and examining DSSI device parameters, enter the WRITE command at the PARAMS> prompt to save the device parameters you have changed using the SET command. The changes are recorded to non-volatile memory.

If you have changed the allocation class or node name of a device, the DUP driver utility will ask you to initialize the controller. Answer Yes (Y) to allow the changes to be recorded and to exit the DUP driver utility.

If you have not changed the allocation class or node name, enter the EXIT command at the PARAMS> prompt to exit the DUP driver utility for the specified device.

1.5.1.3 Using MDM

If neither VMS nor console commands are available on your system, you can access PARAMS through MDM using the following procedure:

1. Boot MDM.
2. Enter the date and time.
3. Select the menus in the following order:
   - Service menu
   - Device menu
   - KFQSAA-KFQSA subsystem menu
   - Device Utilities menu
   - Device Resident Programs menu

   When you select the Device Resident Programs menu, the following is displayed:

```
RUNNING A UTILITY SERVICE TEST

To halt the test at any time and return to the previous menu,
type CTRL/C.

KFQSAA started.
KFQSAA pass 1 test number 3 started.
Copyright 1988 Digital Equipment Corporation
Completed.
EXIT                    DRVEXR                  DRVTST
HISTRY                  ERASE                   PARAMS
DIRECT                  DKUTIL                  PRFMON
VERIFY

Please choose a local program or press Return to continue.
```

4. Enter PARAMS and press Return.
5. Once you are in PARAMS, control is turned over to the utility. All interaction is through the use of commands and responses.

6. To exit PARAMS, enter EXIT at the PARAMS> prompt, or press one of the following: CTRL/C, CTRL/Y, or CTRL/Z.

7. To exit MDM, press the Break key.

1.5.2 Setting the ISE Allocation Class

All DSSI ISEs are shipped with the allocation class set to 0. To determine what the allocation class should be set to, access a different ISE on the system and set the one you are installing to the same allocation class.

In multi-host systems, you must assign the same allocation class to all host systems and all connected ISEs. This allocation class must be different from that of other systems or other hierarchical storage controllers (HSCs) in a cluster.

Use the following procedure to set the allocation class:

1. Determine what the allocation class should be set to by reading it from another ISE which is already working on the system. Use one of the procedures outlined in Section 1.5.1 to access PARAMS on the ISE from which you want to read this information.

2. At the PARAMS> prompt, enter SHOW ALLCLASS. The system displays the following.

```
Parameter      Current        Default       Type      Radix
---------   -----------   -----------    ------   -------
ALLCLASS              1               0     Byte      Dec    B

PARAMS>
```

3. Make a note of the allocation class. In the example above, the allocation class has been set to 1. Exit PARAMS and return to the root prompt (VMS, console, or MDM).

4. Access PARAMS on the newly installed ISE, using one of the procedures outlined in Section 1.5.1.

5. Enter SHOW ALLCLASS. The system responds with:

```
Parameter      Current        Default       Type      Radix
---------   -----------   -----------    ------   -------
ALLCLASS              0               0     Byte      Dec    B

PARAMS>
```

6. Enter SET ALLCLASS 1 (for our example). You want to set the ISE to the same allocation class as all the other ISEs on the DSSI bus.

7. Enter SHOW ALLCLASS to check the new allocation class.

The system responds with:

```
Parameter      Current        Default       Type      Radix
---------   -----------   -----------   ------   -------
ALLCLASS              1             0     Byte      Dec   B

PARAMS>
```

8. Enter WRITE. The system responds with:

```
Changes require controller initialization, ok? [Y/ (N)]
```

9. Enter **Y** to save the new allocation class value.

1.5.3 Setting the MSCP Unit Number

The ISE is set at the factory to read the DSSI node ID as the MSCP unit number. Unit numbers for all DSSI devices connected to a system's associated DSSI buses must be unique. When more than one bus is being used, and your system is using a non-zero allocation class, you need to assign new unit numbers for devices on all but one of the DSSI buses.

When assigning a different unit number, you must also set the FORCEUNI parameter to 0. This allows the unit number you have set to be used. The factory setting for FORCEUNI is 1, forcing the DSSI node ID to be used as the MSCP unit number.

The following example shows how to change the MSCP unit number.

```
PARAMS> sh unitnum
Parameter   Current      Default         Type      Radix
---------  ----------  -----------  ---------  -------
UNITNUM              5            0       Word      Dec   U

PARAMS> set unitnum 21

PARAMS> sh unitnum
Parameter   Current      Default         Type      Radix
---------  ----------  -----------  ---------  -------
UNITNUM             21            0       Word      Dec   U

PARAMS> sh forceuni
Parameter   Current      Default         Type      Radix
---------  ----------  -----------  ---------  -------
FORCEUNI             1            1    Boolean      0/1   U

PARAMS> set forceuni 0

PARAMS> sh forceuni
Parameter   Current      Default         Type      Radix
---------  ----------  -----------  ---------  -------
FORCEUNI             0            1    Boolean      0/1   U
```

```
PARAMS> write
```

1.5.4 Setting the ISE Node Name

Setting the ISE node name is an optional step. All DSSI ISEs come with a computer-generated node name. The user may wish to set this node name to a more recognizable character string.

The following example changes the node name from the default (R1EJAA) to the new string "SUSAN". When entering ASCII strings, you may use single quotes, double quotes, or no quotes at all.

```
PARAMS> show node
Parameter     Current         Default      Type    Radix
---------  -------------  ------------  -------  -----
NODENAME         R1EJAA          RF31     String  ASCII   B

PARAMS> set node "susan"
PARAMS> show node
Parameter     Current         Default      Type    Radix
---------  -------------  ------------  -------  -----
NODENAME         SUSAN           RF31     String  ASCII   B

PARAMS> write
```

NOTE: *Using the WRITE command will make any changes permanent.*

1.6 Testing the ISE

CAUTION: *Running DRVTST may erase all user data on the ISE, and should only be used when installing a new ISE.*

Once the ISE parameters are set, test the drive by using the local program DRVTST. DRVTST is accessed in the same way as PARAMS, using one of the procedures outlined in Section 1.5.1. In this case, instead of specifying PARAMS, specify DRVTST.

DRVTST is a comprehensive hardware test. Once invoked, it will prompt you to specify whether the test should be a read/write test or a read-only test. After you specify the type of test, it will run for 5 minutes. After 5 minutes, DRVTST will indicate either that the test passed, or that a failure occurred.

Once the ISE has passed DRVTST, the installation is complete. If further information on the use of DRVTST is desired, refer to the appropriate integrated storage element user's guide (Appendix A) for a complete description of the DRVTST local program.

1.6.1 DRVTST Example

The following example shows how to run DRVTST. In this example, DRVTST is accessed through VMS on an ISE with a node name R1EJAA.

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST R1EJAA
```

The program displays the following.

```
Copyright © 19nn Digital Equipment Corporation
Write/read anywhere on the medium? [1=Yes/(0=No)]
```

You must respond to the query for the program to continue. By answering yes (1), you select a read-write test, and DRVTST prompts you with another query.

In this case, type 1 Return, selecting a read-write test. DRVTST then displays the following:

```
User data will be corrupted. Proceed? [1=Yes/(0=No)]
```

This query gives you the chance to reconsider. If you answer no (0), then your response to the first query is overridden, and a read-only test is executed. If you answer yes (1), DRVTST begins executing a read-write test of the ISE.

In this case, type 1 Return. During the test, the program displays the following message:

```
  5 minutes to complete.
```

NOTE: *You may abort the test at any time by pressing one of the following key combinations:* CTRL/C, CTRL/Y, *or* CTRL/Z. *If you abort the test, the informational message* `Operation aborted by user` *will be displayed.*

If DRVTST is executed successfully, the following message is displayed.

```
Test passed.
```

1.6.2 Error Messages

If an error condition is found during the execution of DRVTST, an error message is displayed. Two types of errors are reported: soft errors which are corrected during the operation of the ISE, and fatal errors which prevent the ISE from functioning.

The following table indicates the error messages you may see and what they mean.

Message	Description
Soft read error on head xx track yyyy. Soft write error on head xx track yyyy. Soft compare error on head xx track yyyy.	These are soft error messages which indicate that an operation succeeded, but that the error recovery firmware was invoked. These messages may indicate a forced-error flag or correctable ECC error, or that the read/write head was temporarily off-track. These are corrected during normal operation.
xxxx - Unit diagnostics failed.	This is a fatal error. xxxx is the MSCP error code.
xxxx - Unit read/write test failed.	This is a fatal error. xxxx is the MSCP error code.

Make note of any soft error messages that are displayed for possible future reference. If you encounter a fatal error, do not complete the installation.

1.6.3 Problem Resolution

Should you encounter problems during installation, refer to the appropriate system troubleshooting and diagnostics manual.

Chapter 2
TK-Series Tape Drive

2.1 General

TK-series tape drives (Figure 2–1 and Figure 2–2) are Q–bus devices. A TK-series tape drive subsystem requires a TQK-series controller module.

Detailed information for configuring TK-series tape drives is contained in the *Microsystems Options* manual.

Figure 2–1: TK70 Tape Drive Front Panel

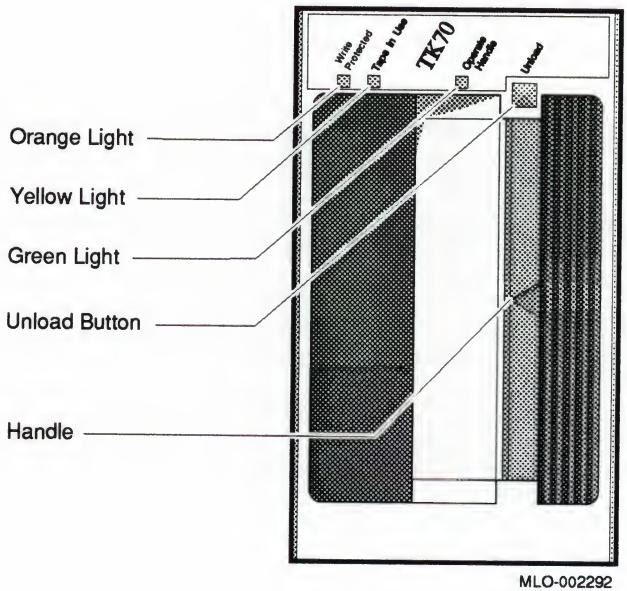
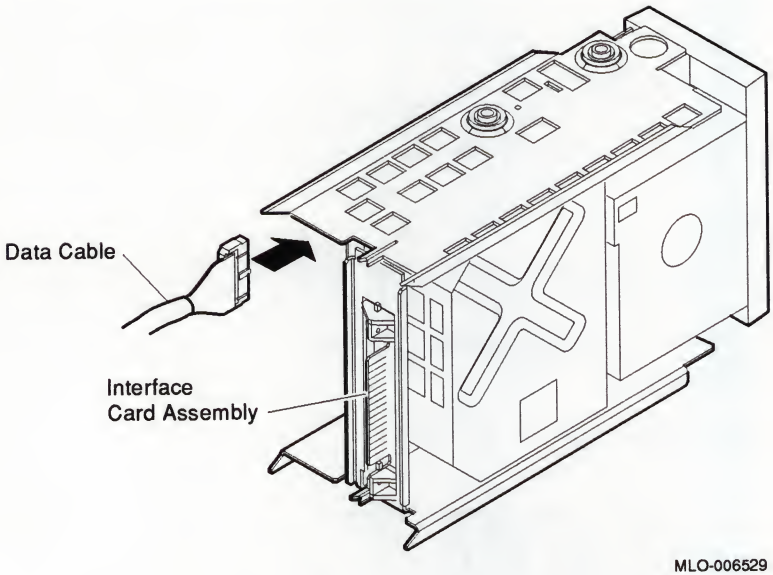


Figure 2–2: TK-Series Tape Drive - Rear View



2.2 TQK-Series Controller Modules

Perform the following procedures to install and configure a TQK-series controller module.

2.2.1 Using the CONFIG Utility for Module Configuration and Naming

Each module in a system must use a unique device address and interrupt vector. The device address is also known as the control and status register (CSR) address. Most modules have switches or jumpers for setting the CSR address and interrupt vector values. The value of a floating address depends on what other modules are housed in the system.

Set CSR addresses and interrupt vectors for a module as follows:

1. Determine the correct values for the module with the CONFIGURE command at the console I/O prompt (>>>). The CONFIG utility eliminates the need to boot the VMS operating system to determine CSRs and interrupt vectors. Enter the CONFIGURE command, then HELP, for the list of supported devices.

```
>>>CONFIGURE
Enter device configuration, HELP, or EXIT
Device, Number? help
Devices:

 LPV11     KXJ11        DLV11J      DZQ11      DZV11      DFA01
 RLV12     TSV05        RXV21       DRV11W     DRV11B     DPV11
 DMV11     DELQA        DEQNA       DESQA      RQDX3      KDA50
 RRD50     RQC25        KFQSA-DISK  TQK50      TQK70      TU81E
 RV20      KFQSA-TAPE   KMV11       IEQ11      DHQ11      DHV11
 CXA16     CXB16        CXY08       VCB01      QVSS       LNV11
 LNV21     QPSS         DSV11       ADV11C     AAV11C     AXV11C
 KWV11C    ADV11D       AAV11D      VCB02      QDSS       DRV11J
 DRQ3B     VSV21        IBQ01       IDV11A     IDV11B     IDV11C
 IDV11D    IAV11A       IAV11B      MIRA       ADQ32      DTC04
 DESNA     IGQ11        DIV32       KIV32      DTCN5      DTC05
 KWV32     QZA
Numbers:
 1 to 255, default is 1
Device,Number? cxa16,1
Device,Number? desqa,1
Device,Number? tqk70
Device,Number? qza
Device,Number? kfqsa-disk
Device,Number? exit

Address/Vector Assignments
-774440/120 DESQA
-772150/154 KFQSA-DISK
-774500/260 TQK70
-760440/300 CXA16
-761300/310 QZA
```

NOTE: *Of the devices listed in the CONFIG display, not all may be supported on your system. See the Microsystems Options manual for supported options.*

The LPV11–SA has two sets of CSR address and interrupt vectors. To determine the correct values for an LPV11–SA, enter LPV11,2 at the `DEVICE` prompt for one LPV11–SA. Enter LPV11,4 for two LPV11–SA modules.

2. Once you have determined the correct address for any TK device on the system, make sure the jumpers on the controller module (Figure 2–3 and Figure 2–4) are set correctly for that address. See Section 2.2.1.1 for examples of jumper configurations.

Figure 2–3: TQK-Series Controller Module (TQK50)

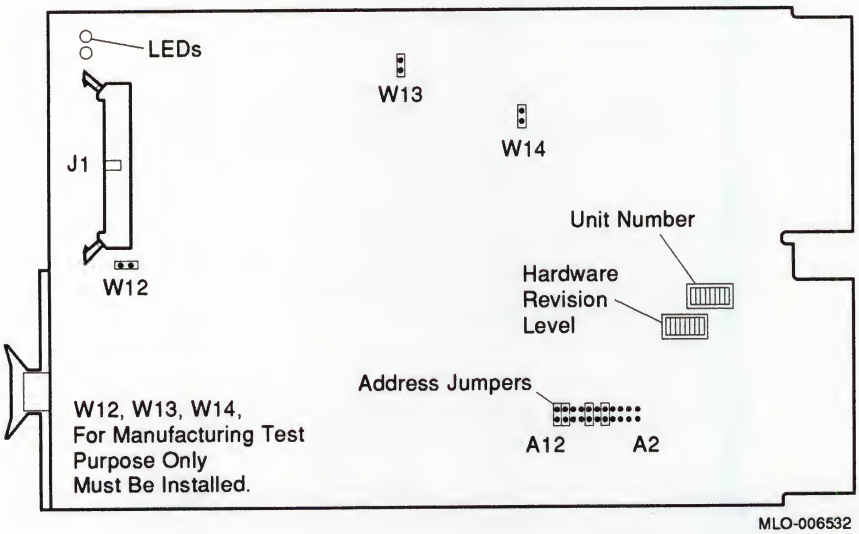
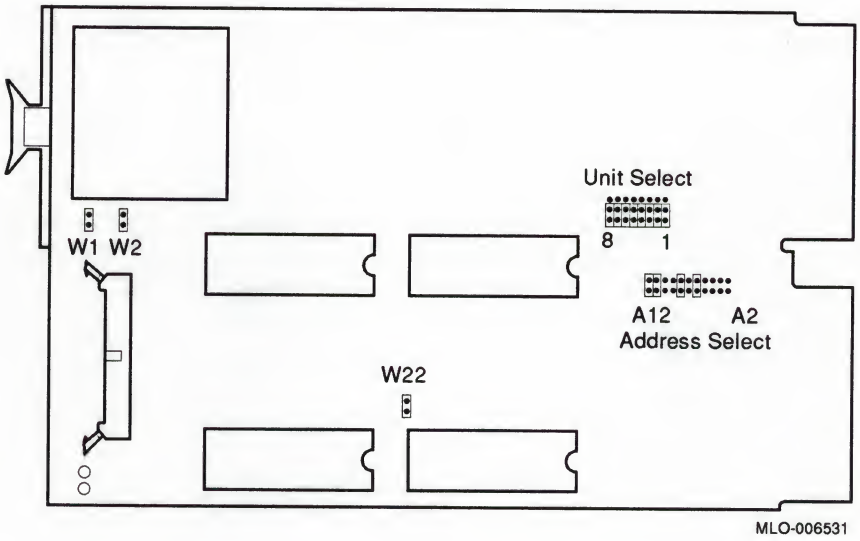


Figure 2–4: TQK-Series Controller Module (TQK70)



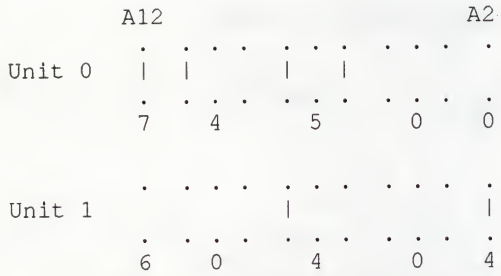
2.2.1.1 Example 1

The following example shows how the jumpers are set for the first logical TK device. (Assume there are two.) Set the jumpers on the new controller as follows:

```
            A12                                 A2
             .   .   .   .   .   .   .   .   .   .
Jumpers      |   |       |   |
             .   .   .   .   .   .   .   .   .   .
Address      7       4       5       0       0
```

2.2.1.2 Example 2

The jumper configuration below signifies the I/O (or CSR) address of 774500 for unit 0, and 760404 for unit 1. Check that the controller for unit 0 has its unit number set for unit 0 and that the controller for unit 1 has its unit number set for unit 1.



On a TQK70 module you can select the unit number by installing the Unit Select jumpers as shown in the following table. If the VMS operating system is installed, you do not have to change the jumper settings.

Table 2–1: Unit Number Settings

Unit Number	Jumpers 8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0[1]
1	0	0	0	0	0	0	0	1[2]
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1
4	0	0	0	0	0	1	0	0
5	0	0	0	0	0	1	0	1
6	0	0	0	0	0	1	1	0
7	0	0	0	0	0	1	1	1

[1] 0 = jumper on center and bottom post

[2] 1 = jumper on center and top post

NOTE: *The unit number settings for a TQK50 module are implemented by setting a DIP switch on the module (Figure 2–3). Switch 8 of the DIP switch is located nearest the module edge.*

2.2.2 Removing ISEs

If integrated storage devices (ISEs) are installed in any mass storage slots, you must remove those devices to route the TQK-series module data cable.

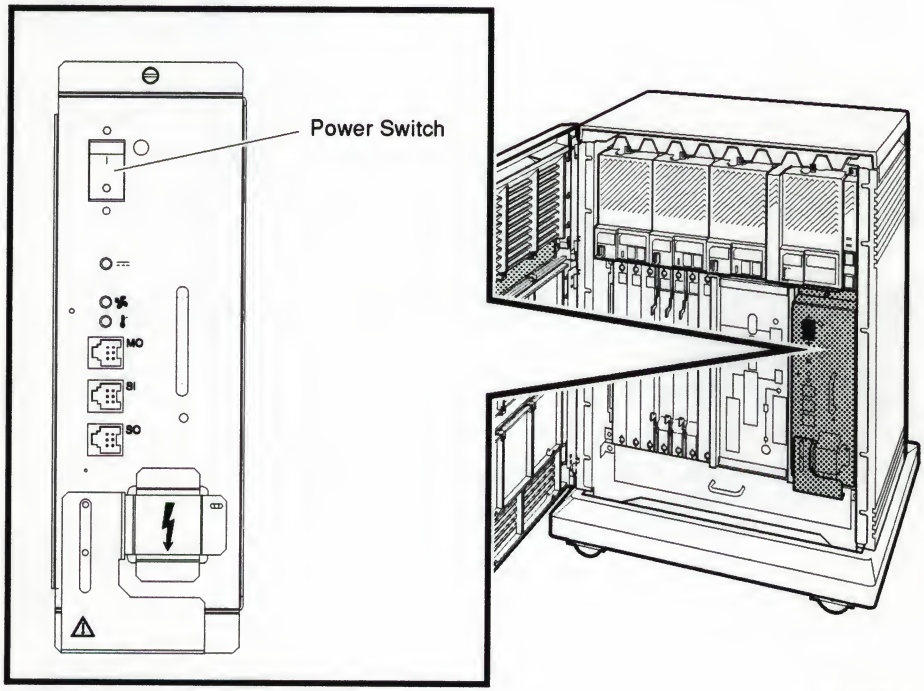
CAUTION: *Static electricity can damage integrated circuits. Always use the antistatic wrist strap and antistatic pad found in the static-protective field*

service kit (29-26246-00) when working with the internal parts of a computer system.

Handle ISEs with care. Dropping or bumping the ISE can damage the disk surface. Carry or hold the ISE by the underside of the lower metal bracket to avoid damage to the drive module.

1. After the system manager shuts down the operating system, open the enclosure door, as described in the appropriate enclosure installation manual listed in Appendix A, and set the Power switch to off (0) (Figure 2–5).

Figure 2–5: Power Switch Location



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2. Loosen the single captive Phillips screws (at the top) that secure the blank ISE panel (70-27049-01) and filler panel (70-27414-01) in mass storage slot 0. Slot 0 is the right-most mass storage cavity in the top row of the enclosure. Remove both blank panels.

3. Loosen the single captive Phillips screw (at the top) that secures an ISE front panel (Figure 2–6A).
4. Separate the ISE front panel from the enclosure, taking care not to strain the remote front panel cable which is connected to the ISE front panel.
5. Unplug the remote front panel cable(s) from the module inside the ISE front panel (Figure 2–6B) and set the panel aside.
6. Label the ISE with the ID number(s) of the front panel that was removed. This front panel must be re-installed with the ISE from which it had been removed so that the unit number (specified by the bus node ID plug) is not changed.
7. Loosen the upper and lower captive screws that hold the ISE in place (Figure 2–6C).
8. Using the upper and lower finger cutouts on the ISE brackets, carefully pull the ISE out of its backplane connector and slide the drive out of the enclosure. Support the weight of the ISE at the underside of the lower bracket as the ISE clears the enclosure (Figure 2–6C).

CAUTION: *Do not touch the drive module. The drive module contains sensitive electronic circuitry.*

2.2.3 Installing the TQK-Series Controller Module and TK-Series Tape Drive

Install the TQK-series controller module and TK-series tape drive as follows.

1. Install the TQK-series controller module in the first available Q–bus slot (Figure 2–7).

Figure 2–6: Removing an ISE

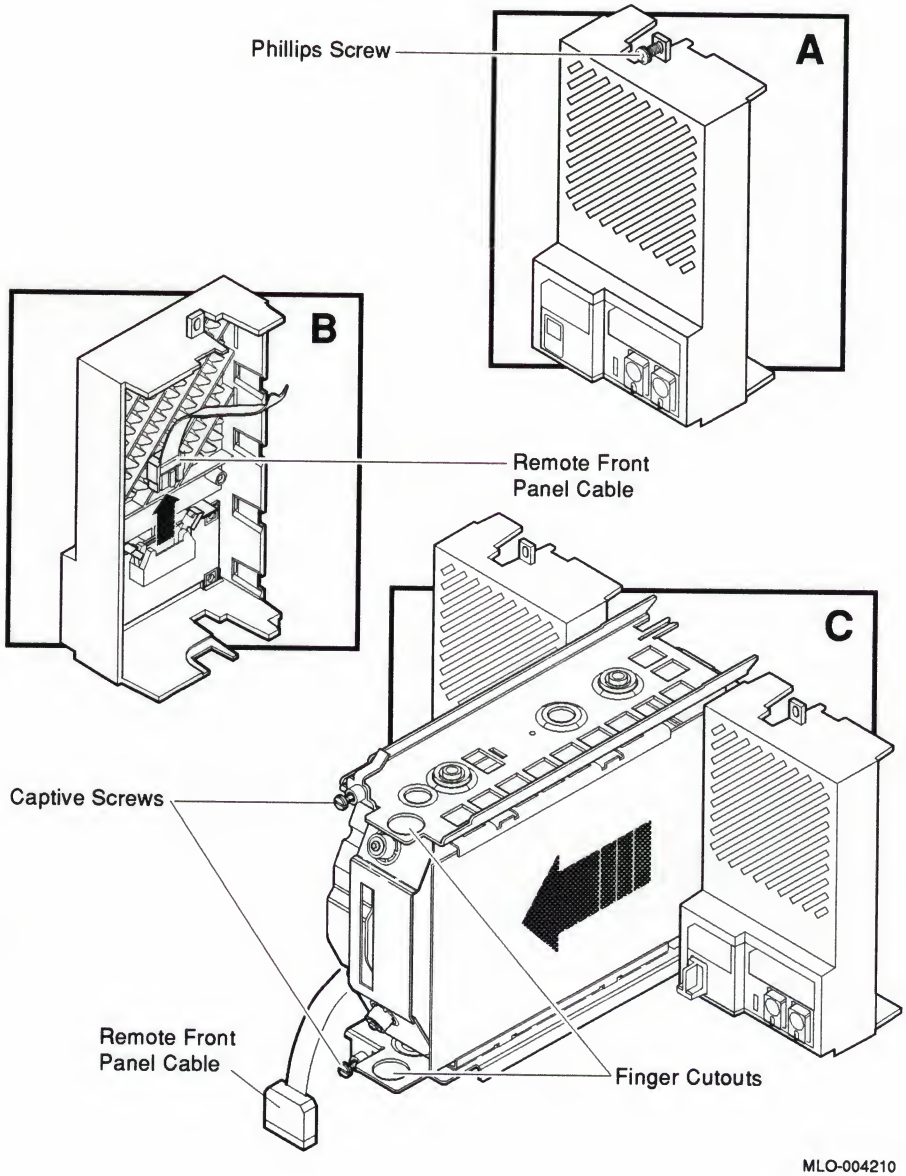
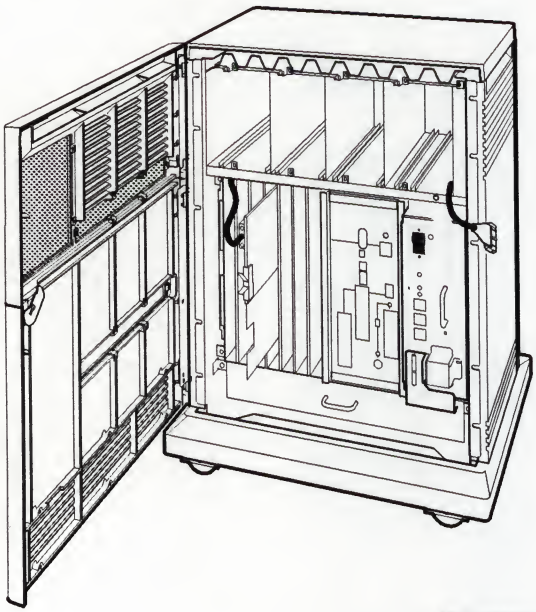


Figure 2–7: Installing the TQK-Series Controller Module and Routing the Data Cable



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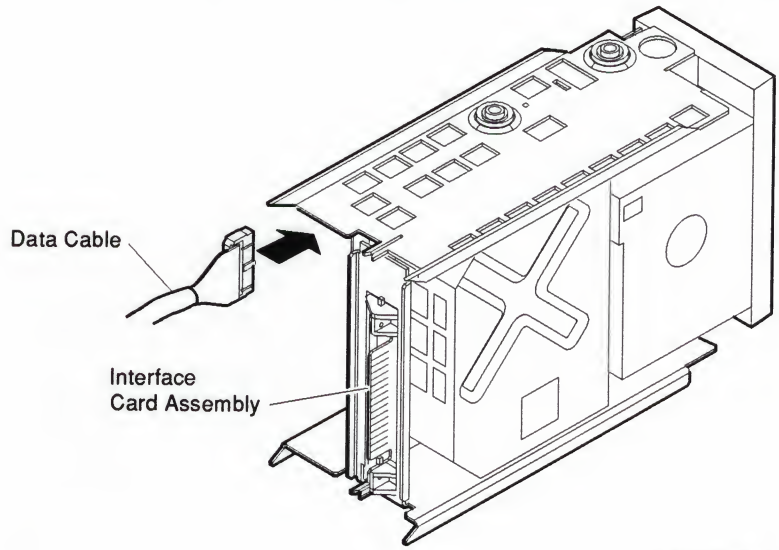
2. Connect the TQK-series data cable (TK50/TK70: 17-01363-01) to the module. Route the cable up through the card cage and along the front of the hollow cavity between the card cage area and mass storage cavity to slot 0 of the mass storage cavity. Route the cable to the back of slot 0, out of the hollow cavity, and then to the front of slot 0 (Figure 2–7). Dress the cable so that it does not interfere with air flow or the re-installation of ISEs.
3. Grasp the TQK data cable located in mass storage slot 0, and connect it to the rear of the TK-series tape drive (Figure 2–8).

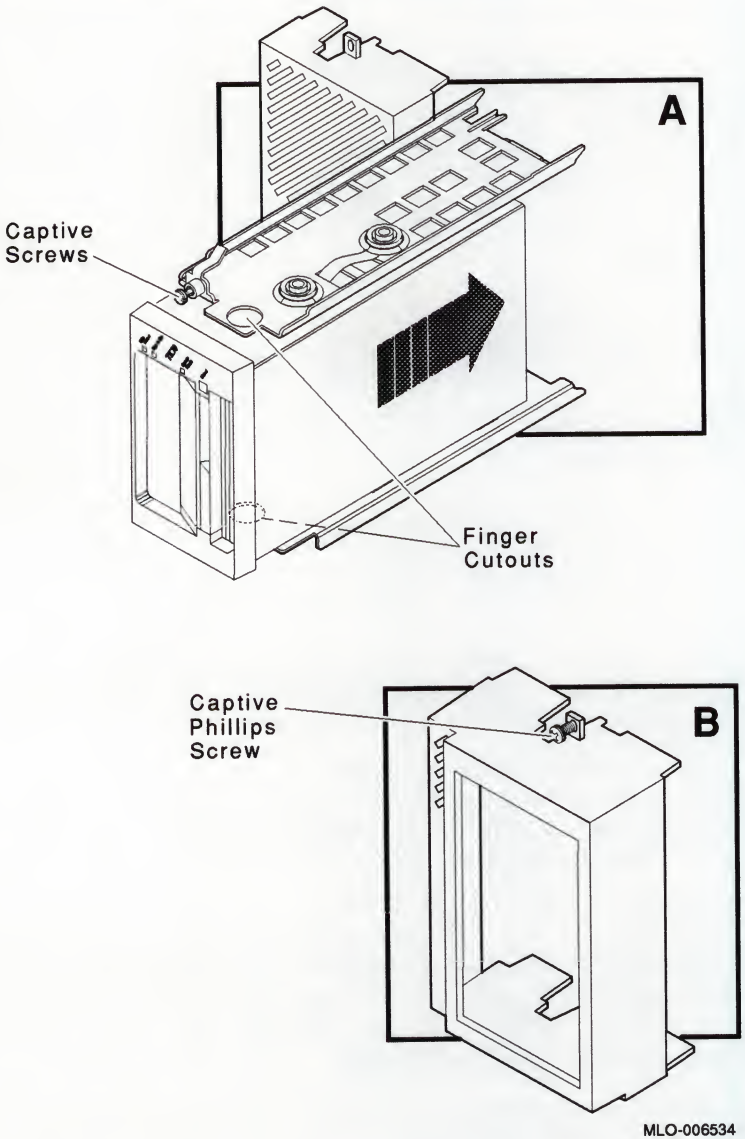
Figure 2–8: Attaching the Data Cable to the TK-Series Tape Drive



4. With the TK-series tape drive upright (LEDs at the top), slide the drive along the guide rails (Figure 2–9A) into mass storage slot 0. Tape drives install only into mass storage slot 0.
5. Using the upper and lower finger cutouts on the drive brackets, (Figure 2–9A) firmly push the drive brackets until the interface card at the rear of the drive plugs into its backplane connector. Be careful not to pinch the cable when inserting the drive.
6. Tighten the two captive screws (Figure 2–9A).

   CAUTION: *It is normal for there to be a small gap between the drive mounting bracket tabs and the enclosure frame. Tighten the captive screws only until they are securely fastened (9 inch pounds). Do not try to force the tabs to fit flush against the frame.*
7. Attach the drive front panel to the enclosure by first fitting the panel's lower tabs into position. Secure the panel with its single captive Phillips screw (Figure 2–9B).

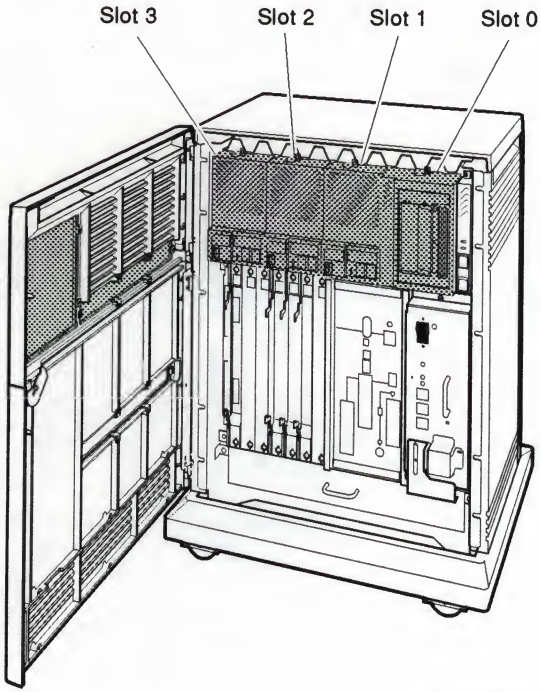
Figure 2–9: Installing a TK-Series Tape Drive



To replace the ISEs, reverse the procedure in Section 2.2.2. For additional information on removing and replacing the ISEs, refer to the appropriate BA400-series enclosure maintenance guide (see Appendix A).

The ISEs and tape drive are shown installed in Figure 2–10.

Figure 2–10: ISEs and Tape Drive Installed



2.3 Power-On Self-Test (POST)

The tape drive board contains firmware that enables testing of basic drive functions. Faults are indicated by the LED indicators on the front panel and error codes are sent to the controller.

2.3.1 TK70 Tape Drive

To execute power-up self-test of the TK70 tape drive perform the following.

1. Turn on the system.
2. Observe that all three indicators (orange, yellow, and green) glow steadily. (See Figure 2–1.)

3. Observe that only the yellow indicator blinks. This indicates that the self-test is running.
4. Observe that the green indicator remains lit steadily.

When the green indicator remains on steadily, self-test has passed. The handle may now be operated and a tape cartridge inserted into the unit.

If all three indicators are blinking, a fault is occurring. The indicators will continue to blink if the fault is not cleared. For problem resolution, refer to the appropriate system troubleshooting and diagnostics manual.

2.3.2 TK50 Tape Drive

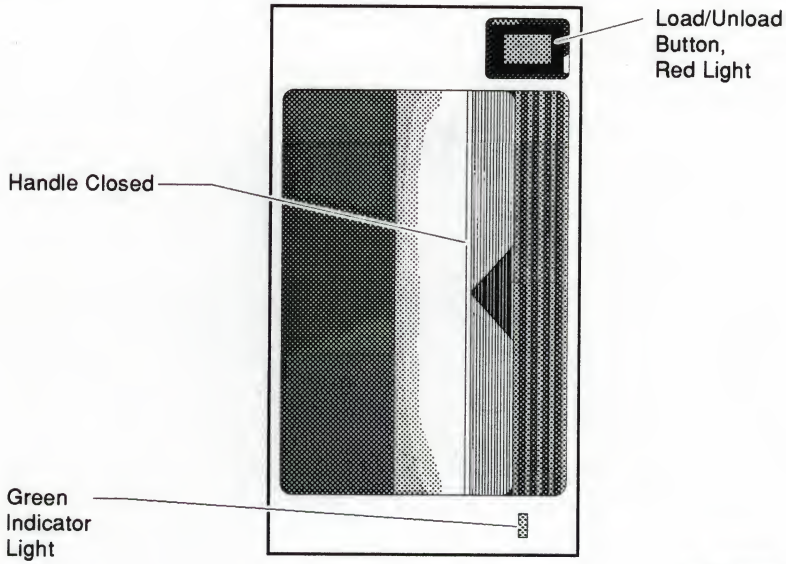
To execute the power-up self-test of the TK50 tape drive, perform the following.

1. Turn on the system.
2. Observe that the red indicator glows steadily and the green indicator is off. (See Figure 2–11.) This indicates that the self-test is running.
3. Observe that the red indicator goes off and the green indicator glows steadily.

When the green indicator remains on, the cartridge release handle may be lifted and a tape cartridge inserted into the unit.

If the red indicator remains in a flashing state, there is a fault. Press and release the LOAD/UNLOAD button four times. If the failure repeats, refer to the appropriate system troubleshooting and diagnostics manual.

Figure 2–11: TK50 Tape Drive Front Panel

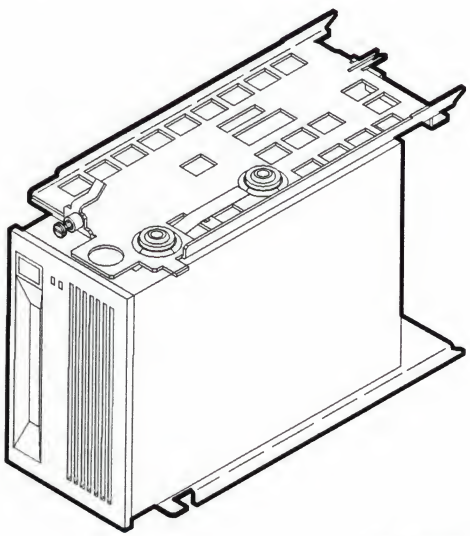


Chapter 3
TLZ04 Tape Drive

3.1 General

The TLZ04 tape drive (Figure 3–1) is a 5-1/4 inch tape drive with a data storage capacity of 1.2 gigabytes. The TLZ04 tape drive interfaces to the system by means of a Small Computer System Interface (SCSI).

Figure 3–1: TLZ04 Tape Drive



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For more detailed information about installing add-on storage devices into a BA400-series enclosure, refer to the appropriate enclosure maintenance guide (see Appendix A).

3.2 Installation Procedure

To install the TLZ04 tape drive into a BA400-series enclosure, perform the following procedures.

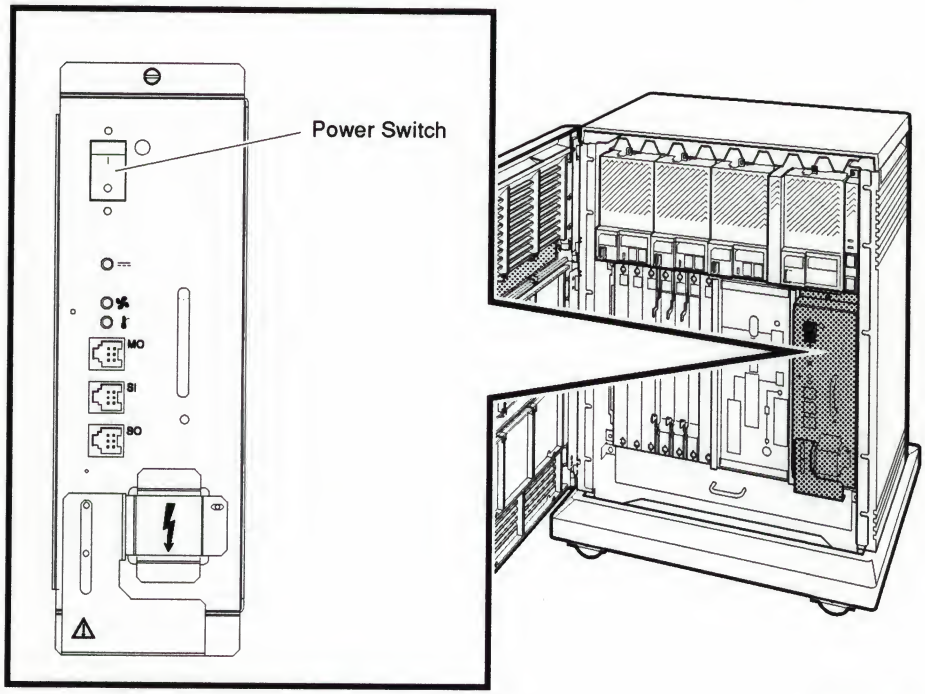
3.2.1 Tape Drive Installation

CAUTION: *Static electricity can damage integrated circuits. Use the antistatic wrist strap and antistatic pad found in the static-protective field service kit (29-26246-00) when you work with the internal parts of a computer system.*

Handle the TLZ04 tape drive with care. Dropping or bumping the drive can damage the product. Carry or hold the drive by the underside of the lower metal bracket to avoid damaging the drive module.

1. After the system manager shuts down the operating system, open the enclosure door, as described in the appropriate enclosure manual listed in Appendix A, and set the Power switch to off (0) (Figure 3–2).

Figure 3–2: Power Switch Location



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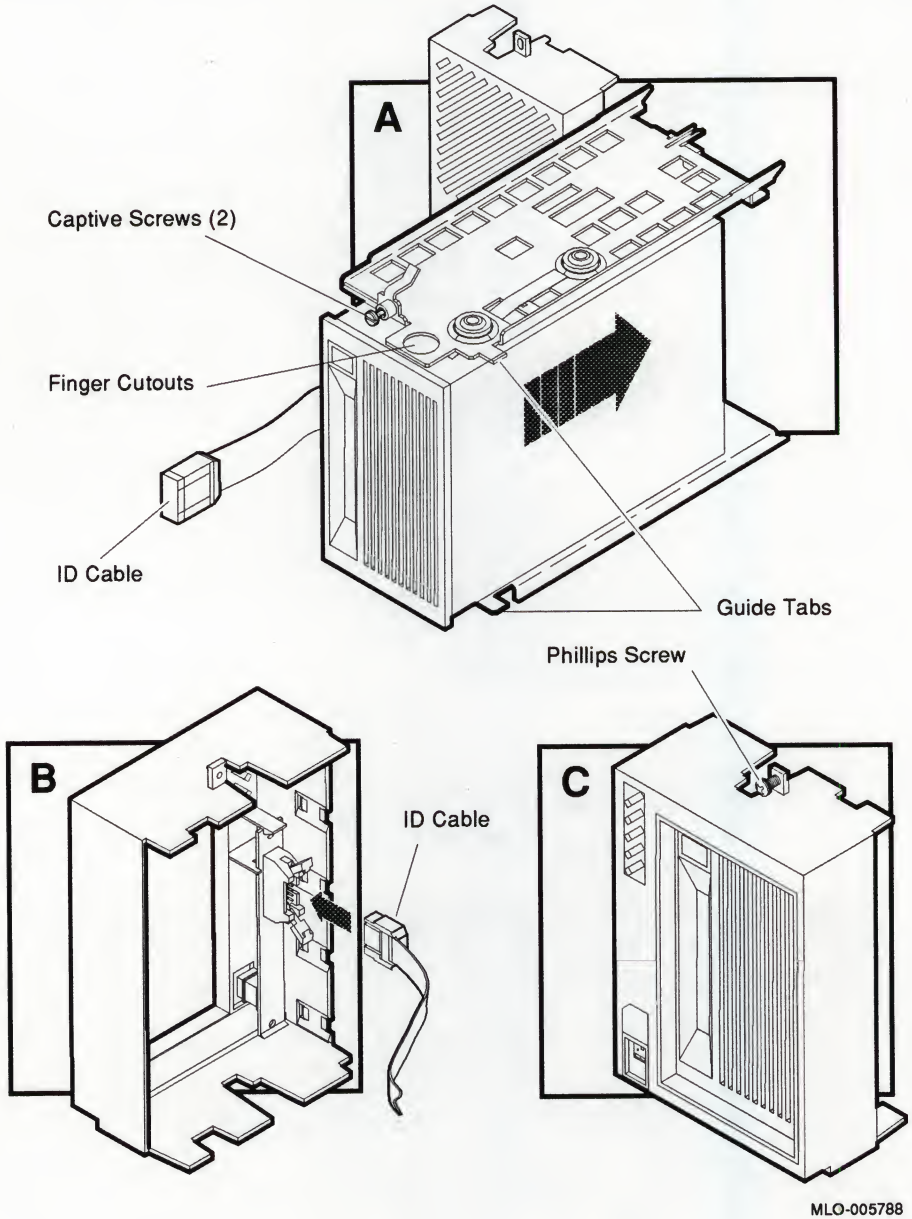
2. Loosen the captive Phillips screws (at the top) and remove the front panel (70-27049-01) and filler panel (70-27414-01) located in mass storage slot 0. Slot 0 is the right-most mass storage cavity in the top row of the enclosure.

3. With the tape drive right side up (LEDs at top), slide the drive (Figure 3–3A) into mass storage slot 0. The TLZ04 tape drive is installed only in mass storage slot 0.

Figure 3–3: Installing the TLZ04 Drive



4. Using the upper and lower finger cutouts on the brackets, firmly push the drive brackets until the interface card at the rear of the drive plugs into its backplane connector. Tighten the two captive screws (Figure 3–3A).

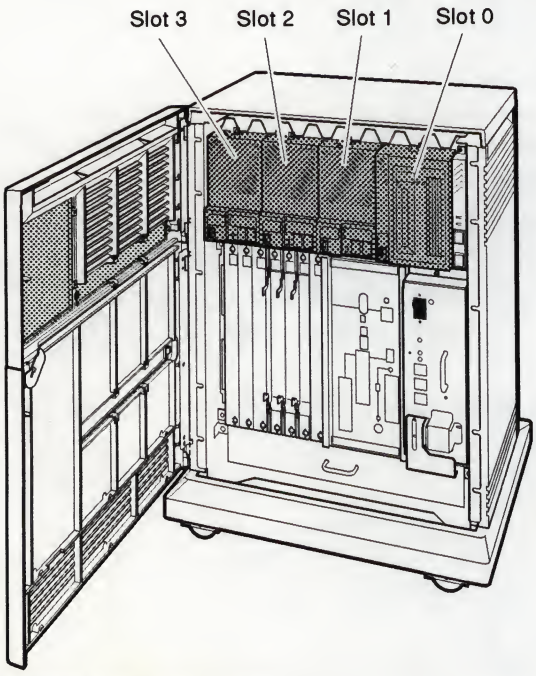
   CAUTION: *It is normal for there to be a small gap between the mounting bracket tabs and the enclosure frame. Tighten the captive screws only until they are securely fastened (9 inch pounds). Do not try to force the tabs to fit flush against the frame.*

5. Plug the ID cable into the connector inside the drive front panel as shown in Figure 3–3B.

6. Attach the drive front panel to the enclosure by first fitting the panel's lower tabs into position. Secure the panel with its single captive Phillips screw (Figure 3–3C).

Figure 3–4 shows the TLZ04 tape drive installed in mass storage slot 0.

Figure 3–4: TLZ04 Drive Installed in Mass Storage Slot 0

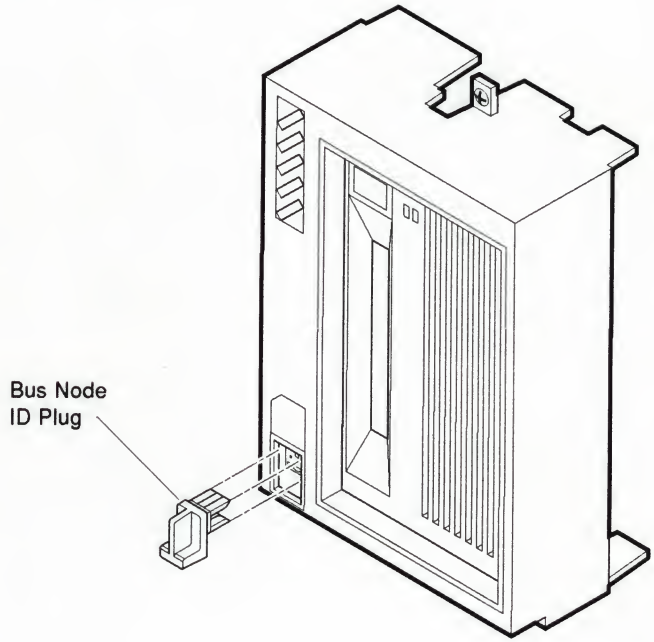


3.2.2 Bus Node ID Plug

The TLZ04 tape drive uses a bus node ID plug to identify, or address, the TLZ04 drive. The bus node ID that the TLZ04 drive uses is dependent on other SCSI devices in the system.

Bus node ID plugs, (12-28766-28, Figure 3–5) have prongs on their backs that identify the bus node ID number (and by default, the unit number) of the TLZ04 drive to the system. Bus node ID plugs are shipped with the host system or host expander.

Figure 3–5: Bus Node ID Plug



To insert a bus node ID plug, align the two center prongs with the two center slots of the receptacle in the front panel assembly (Figure 3–5). Push the plug firmly into the receptacle. To remove a bus node ID plug, grasp it firmly and pull it straight out.

3.2.3 Selecting the Correct Bus Node ID Plug

The following steps show you how to select the correct bus node ID plug.

1. If you are installing the TLZ04 drive on a system that already has a SCSI device, use any available SCSI ID. SCSI ID 7 is typically reserved for the host adapter, and is the default ID for the KZQSA. Typically IDs 0–6 are used for SCSI devices, in ascending order beginning with zero. (You may need to consult your system manager for available bus node IDs.)

2. If you are installing multiple TLZ04 (or other SCSI) drives, the bus node node ID for each drive should be set with the drive's own, unique

bus node ID. No two drives on the same SCSI bus can have the same bus node IDs.

3. To determine the ID plug, you must first determine what SCSI IDs are already being used on the system. This can be accomplished by using the SHOW SCSI console command. Entering the SHOW SCSI command will cause the system to list the SCSI devices currently on the system. The bus node ID number can be read from the SCSI device names listed. For example, SCSI ID 1 is MKA100, SCSI ID 2 is MKA200, and so on. Use the first free SCSI ID for the new device. If there is already a TLZ04 drive on the system at SCSI ID 0, assign the new device to SCSI ID 1.

The device names given in the previous example apply to SCSI tape devices. For a tape device on the KZQSA adapter designated as MKA100, the device name is assigned in the following manner.

```
ddbuuu

Where:  dd = device type, i.e.,
        MK = tape device

         b = controller, i.e.,
         A = first KZQSA adapter on the bus

       uuu = bus node ID number × 100, i.e.,
       100 = bus node ID 1
```

NOTE: *If you change the bus node ID plugs while the system is operating, you must turn off the system and then turn it back on for the new plug positions to take effect.*

3.3 Completing the Installation

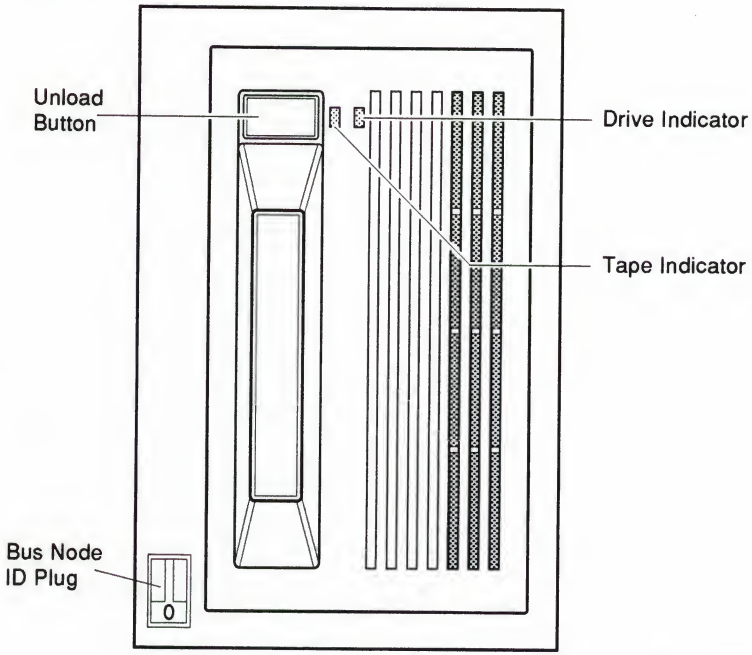
This section explains how to verify the correct operation of the TLZ04 tape drive once it has been installed.

3.3.1 Power-On Self-Test (POST)

To execute power-on self test of the TLZ04 drive, do the following.

1. Turn on the system.
2. Observe that the tape indicator flashes yellow and the drive indicator flashes green for approximately 30 seconds. (See Figure 3–6.)

Figure 3–6: TLZ04 Tape Drive Front Panel



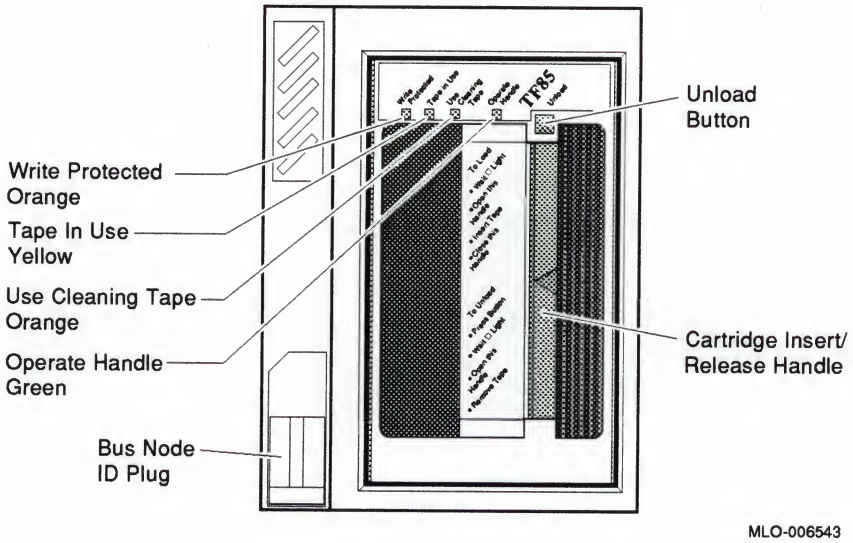
3. Observe that only the drive indicator (green) remains lit. This indicates that power-on self-test executed successfully.
4. If the tape indicator flashes yellow and the drive indicator remains green steadily, power-on self-test failed. Attempt to clear the failure by repeating the power-on self-test (turn off and turn on the system). If the failure repeats, refer to the appropriate system troubleshooting and diagnostics manual.

Chapter 4
TF-Series Tape Drive

4.1 General

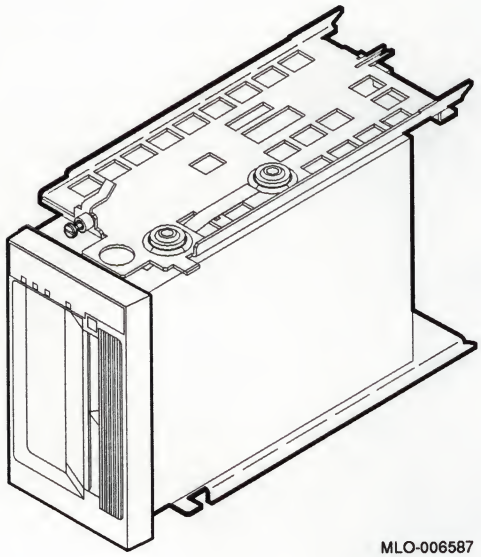
The TF85 drive (Figure 4–1) is a streaming tape drive that stores up to 2.6 gigabytes of data on a CompacTape III tape cartridge.

Figure 4–1: TF85 Tape Drive Front Panel



The TF85 tape drive (Figure 4–2) includes a drive, a two-board controller, and a read/write servo module. The controller logic, which is mounted on the left side of the drive, consists of a DSSI interface personality board and a formatter/ECC control board. The read/write servo board is mounted on the right side of the drive.

Figure 4–2: TF-Series Tape Drive



MLO-006587

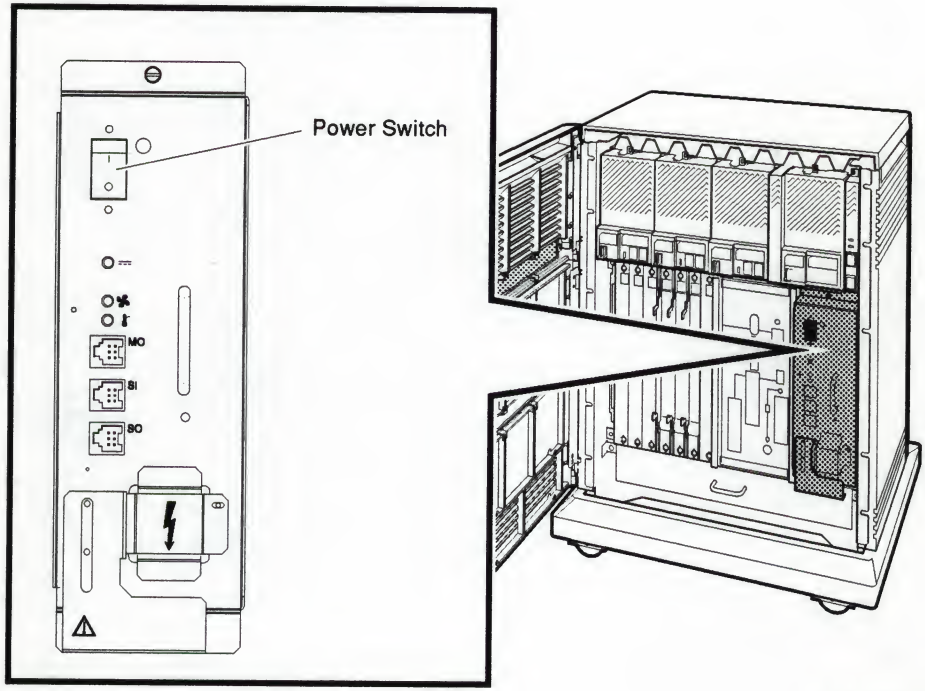
4.2 TF-Series Tape Drive Installation

CAUTION: *Static electricity can damage integrated circuits. Use the antistatic wrist strap and antistatic pad found in the static-protective field service kit (29-26246-00) when you work with the internal parts of a computer system.*

Handle the TF-series tape drive with care. Dropping or bumping the drive can damage the product. Carry or hold the drive by the underside of the lower metal bracket to avoid damaging the drive module.

1. After the system manager performs a shutdown of the operating system, open the enclosure door, as described in the appropriate enclosure installation manual listed in Appendix A, and set the Power switch to off (0) (Figure 4–3).

Figure 4–3: Power Switch Location



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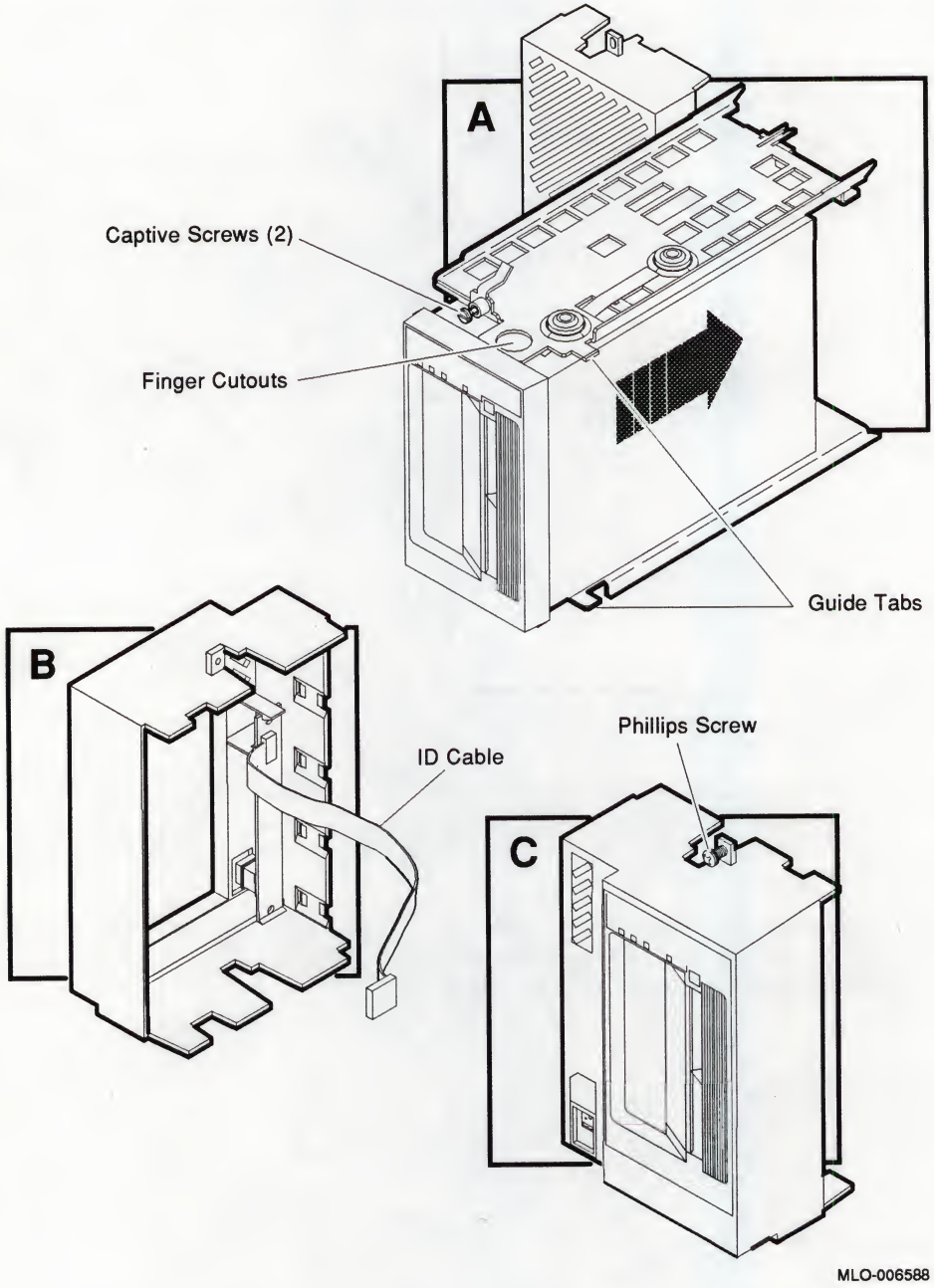
2. Loosen the captive Phillips screws (at the top) and remove the blank front panel (70-27049-01) and filler panel (70-27414-01) located in mass storage slot 0. Slot 0 is the right-most mass storage cavity in the top row of the enclosure.

3. With the tape drive right side up (LEDs at top), slide the drive (Figure 4–4A) into mass storage slot 0. The TF-series tape drive is installed only in mass storage slot 0.

Figure 4–4: Installing the TF-Series Drive



4. Using the upper and lower finger cutouts on the brackets, firmly push the drive brackets until the interface card at the rear of the drive plugs into its backplane connector. Tighten the two captive screws (Figure 4–4A).

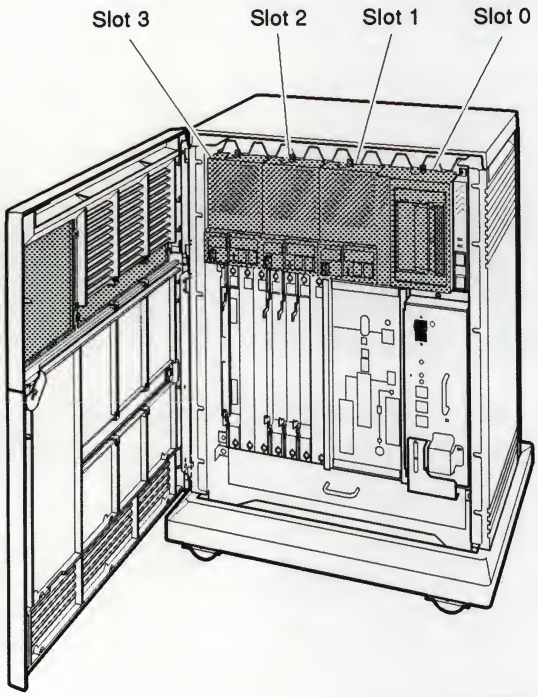
   CAUTION: *It is normal for there to be a small gap between the mounting bracket tabs and the enclosure frame. Tighten the captive screws only until they are securely fastened (9 inch pounds). Do not try to force the tabs to fit flush against the frame.*

5. Plug the ID cable (Figure 4–4B) into the connector on the front of the TF controller board.

6. Attach the drive's front panel to the enclosure by first fitting the panel's lower tabs into position. Secure the panel with its single captive Phillips screw (Figure 4–4C).

   Figure 4–5 shows the TF-series tape drive installed in the enclosure.

Figure 4–5: TF-Series Drive Installed in Mass Storage Slot 0



4.3 TF-Series Power-On Self-Test (POST)

The purpose of the power-on self-test (POST) microdiagnostics is to perform a comprehensive self-test of the personality card logic. The POST diagnostics are executed at power-up when the controller is reinitialized.

After applying power to the system, the TF85 goes through the power-on self-test diagnostic. The LEDs on the front panel (Figure 4–1) go through the following sequence.

1. The Write Protected (orange), Tape in Use (yellow), Use Cleaning Tape (orange), and Operate Handle (green) indicators turn on steadily for approximately two seconds.
2. The green and both orange LEDs turn off.

3. The yellow LED blinks, indicating that the power-on self-tests are running.

When the self-test completes successfully, the green LED turns on and a beep sounds to indicate that you may operate the cartridge insert/release handle.

If self-test fails, all four indicators will blink. Refer to the appropriate system troubleshooting and diagnostics manual.

4.4 Setting the ISE Parameters

Once the TF85 passes power-on self-test, the DSSI parameters must be set. This is done in the same way as the RF- and RZ-series ISEs procedures in Section 1.5.

Appendix A
Related Documentation

Document	Order Number
BA430/440 Enclosure Maintenance	EK–348A*–MG
Microsystems Options	EK–192A*–MG
Micro/VAX Diagnostic Monitor User's Guide	AA–FM7A*–DN
R400X Expander Installation and Maintenance	EK–349A*–MG
RF Series Integrated Storage Element User Guide	EK–RF72D–UG
TF85 Cartridge Tape Subsystem Owner's Manual	EK–OTF85–OM
BA400 Series Mass Storage Devices	EK–441AC–IP

NOTE: * *Indicates the revision code. The latest revision will always be shipped when a manual is ordered.*

Index

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Storage Devices Installation Procedures

EK–BA44A–IN–004

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Examples (useful)	☐	☐	☐	☐
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